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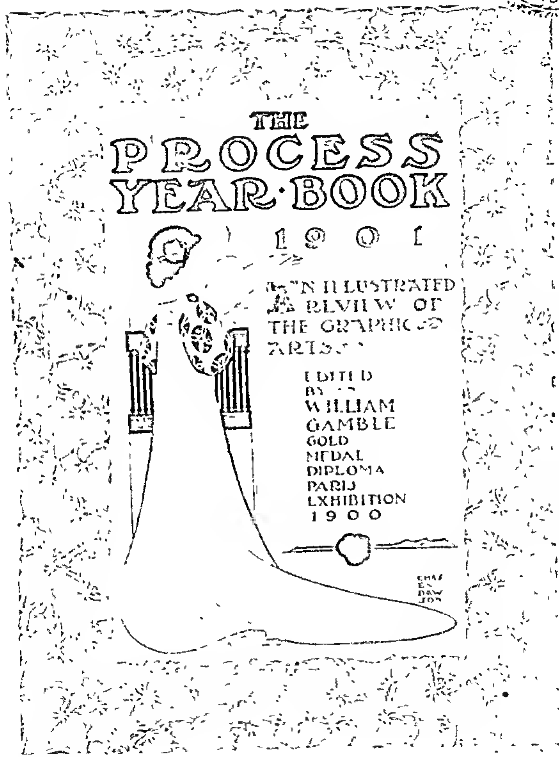
THE
PROCESS
YEAR·BOOK
1901
AN ILLUSTRATED
REVIEW OF
THE GRAPHIC
ARTS
EDITED
BY
WILLIAM
GAMBLE
GOLD
MEDAL
DIPLOMA
PARIS
EXHIBITION
1900
CHAS
E.
DAWSON

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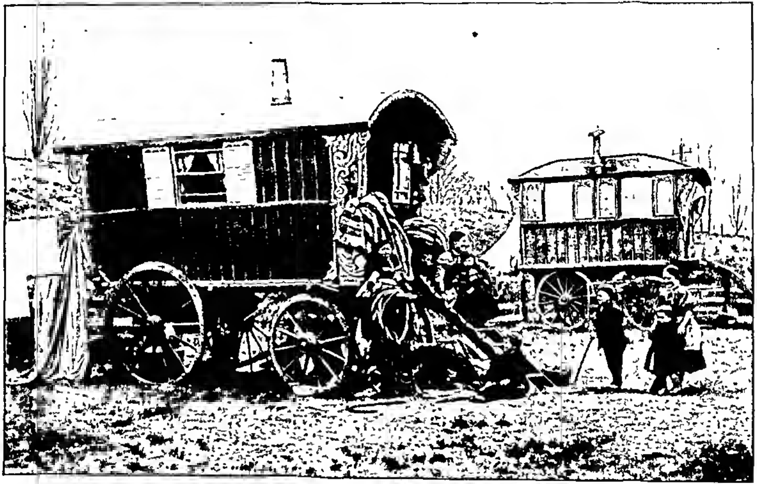

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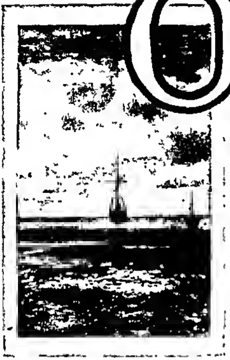
By the Editor.



CLOUDS OF THE WEST

Photo by
F O SNELL

ONCE more we put forth our pictorial record of progress in the photo-mechanical arts, and we do so with a feeling that we have fewer shortcomings to apologise for. On the contrary, we go to press with the present volume with some pride and satisfaction, being conscious, from the evidence of its integral parts, that when bound up it will be a book worthy of its past reputation, and such as will again win that kindly praise which has been so freely lavished on previous volumes. It is hard work to raise each year the standard of excellence of such a book as this, and harder still because we cannot devote our whole time to it, being only able to deal with it in spare moments, which do not come round any too frequently in a busy commercial life. But the task is made pleasanter and easier by the generous willingness to assist which is invariably shown by those invited to contribute. Where pictures, blocks and articles are in the majority of cases given free of charge it is impossible to exercise any rigid selection, but had we to do so there is very little we should be inclined to eliminate. The variety of work is sufficient to make all of it interesting and instructive, even though some of it may not be accounted in the highest degree artistic or technically perfect. We feel, at any rate, that our book is worthily representative of the work which is being done at the present time in those branches of the graphic arts which we deal with, and we have endeavoured to give the specimens the most attractive setting in regard to paper and print.

In regard to the character of the examples presented, we would point out that in no department of process work is progress so conspicuous as in the three-colour method, of which we give a variety of specimens such as has, perhaps, never before been collected together between the covers of a single book. We feel sure that these results will be viewed with intense interest, because this is the one branch of process work to which we must look for the possibility of the greatest progress. All other processes seem to have reached their highest realization, but in this three-colour work there is yet much to be done, not only from the optical and photographic side, but from the process and printing sides of the question. Yet the greatest sign of hopefulness of the process is the fact that the process is being rapidly brought down to the same degree of certainty in working as the half-tone process, and the amount of hand work by way of fine etching, which was formerly lavished on the blocks, is now very considerably reduced. Machinery more adaptable for the printing of these blocks is rapidly making its way into every printing office, and printers are becoming more accustomed to the handling of the

blocks. Under such circumstances the time cannot be far distant when the oft-made prediction that periodicals will be illustrated in colour instead of black and white may be fully realized.

Having said so much about the work, we would like to say a few words about the workers, because it rests with them to direct the destiny of these processes. We are glad to say that a superior class of men are commanding the best positions in the trade, and in their hands we have no doubt that the tendency will be to make for greater progress. Not only is the business side of the work better handled, but the technical side is constantly being improved by the introduction of earnest, young and active workers, who have supplemented their workshop knowledge by studies at technical schools, by home study, and by reading all that has been published concerning their craft. But we hope these young men will never be misled into believing that learning from schools and books is adequate equipment for getting through life. By all means let them learn all they can from their teachers, by all means read to the fullest from their text books and trade journals; but, above all things, we counsel them to cultivate the habit of *thinking*, so that they may understand thoroughly all they see, hear and read, that they may the more readily apply it to the improvement of their work. In this, as in all other businesses, experience is the greatest teacher. The time has gone by when men were content to shut themselves up in studious solitude and delude themselves with the belief that they were acquiring all knowledge that man could attain to from their books. To-day men learn not so much from books, but go forth into the world and study men and things—Nature's great open book—and those who are the most receptive of knowledge gained in this way are the most likely to attain to positions of the greatest success in life, besides making the world richer, and perhaps wiser, by their efforts

Block by F. CATLING

Pen Drawing by MISS M. E. LLOYD

A Wonderful Process.

By the Editor.

DULL, WET DECEMBER

Block by L. W. ASHWORTH Photo by C. W. PHILPOTT

AFTER all, it is only about the half-tone process that I propose to write; and it is perhaps best to state this at the outset, or some of my readers may say that the title is misleading and turn away from my article with somewhat of the disgust which a choleric individual experiences, when he has read half through a newspaper column before he discovers it is only one of those ingenious quack medicine puffs with an ad. in the tail of it.

The man who is working the half-tone process every day would probably say there is nothing very wonderful about it, yet I hope to persuade him that the process he is engaged in may *fairly* claim to be regarded as one of the most wonderful inventions of the latter end of the nineteenth century.

So quietly has the process grown and improved and worked its way into more and more extended use, that its advent has been hardly noticed; and certainly it has scarcely been realized how great a change has been wrought in the character of our books and periodicals by means of this process. Indeed, the great bulk of the reading public have probably not noticed that any change has taken place. They have seen the numbers of illustrated periodicals increased to an almost bewildering extent, far beyond their power to keep pace with them; and that more and more illustrations have been furnished for their money. They may have also noticed that the illustrations have "*looked like* photographs;" whilst a few of the more curious may have examined the prints more closely and wondered why

The Picture was Split Up into Little Dots.

But what the process was and why it had superseded the old-fashioned woodcut was a thought that never occurred to the majority. A few people, without enquiring into the nature of the process, may have concluded from the general poorness of the illustrations in some publications which laid themselves out to give a "lot for money," that the process was a cheap one. Others would certainly conclude, from the rapidity with which public events were pictorially recorded in the illustrated weekly papers, that the process was a quick one. But the "man in the street," I am sure, has never thought anything about it. He has just *skimmed* over the *illustrations in the papers and magazines* with a careless interest, and never given a thought how they were done. Some he admired, some he thought poor, some were interesting, some were instructive, others were amusing—that is all he thought about them. When he found his morning or evening paper devoting space to illustrations for the first time, it may have *struck him as curious and as thrusting out interesting news*. But, on the whole, the "man in the street" has not been seriously affected by the new kind of illustrations, taking them as a matter of course—just as he now dives down the "twopenny tube" and takes his seat in the electric train with no more thought

than he would give had he been doing the same thing for the last twenty years. The public is not altogether ungrateful for the advantages of living in this advanced age, but it is very indifferent in regard to the way the improvement came about.

So it is, then, that the term "half-tone" conveys no meaning to the general public; and even a great many editors, printers, publishers and others who are using the term every day have, I fancy, only a vague idea of the process. If they were asked for an explanation of the term "half tone" they would probably answer something in this way "Oh, yes, that's the process where the photograph is split up into little dots by taking it through a screen."

"And Why is it Called Half-tone?"

an inquisitive person would ask. I have heard the answer given, "Because you don't get the full tones of the photograph; it's all reduced to a half-tone." "And what is a 'screen?'" pursues the inquisitive person. "How can you photograph through a screen unless you use the X rays?" "Oh, the screen is a glass plate with a network of lines on it,' replies the catechised man. "Is the screen put over the photograph, then?" "No, they put it in the camera in front of the sensitized plate." "Ah! I see now. The screen divides up the picture into little squares, of course. What an ingenious process!"

Now, this sort of explanation satisfies most people, but it's a very crude exposition of the process. And the assumption as to the screen "chopping up the picture into little dots," as so often expressed, is entirely wrong. It was not until workers in the half-tone process realized the fallacy of such a view that they began to make any real progress, as I shall presently show.

The real explanation of the use of the term "half-tone" is also quite contrary to the accepted one. The expression arose in this way:—

In the Early Days of the Process

it was usual to advertise the new method as "a process for reproducing all the delicate half-tones of photographs," or some similar phrase embodying the words "half-tone." Naturally it was soon shortened into "the half-tone process," and this term is now applied almost universally to blocks produced by the ruled screen, although the method of production may vary in detail.

Formerly it was usual for every inventor of a new half-tone method to prefix his name to it; and we had the Meisenbach process and the Ives process; or Swantype, Mosstype, etc. All these designatious have practically gone out of usage in favour of the popular term "half tone." In Germany the term "Autotypie," originally given to the process by Meisenbach, is very generally used, though "der Halbtonprozess" is well understood. In France, although the most classical title is perhaps "la photo typogravure à demi teintes," it is more often called "simili" or "similigravure." Formerly the phrase "nature process" was much used in England and France. It must be confessed that the term "half-tone" is inelegant and inexpressive, but it has passed into currency and must be tolerated. Whether it has yet found its way into the dictionaries I do not know.

Now let me try to make plain what "half tone" means in relation to this process. The antithesis of half-tone is

The "Line" Process,

which will reproduce anything which is in black or in any monochrome on a white or light ground. The only condition is that there must be only one shade or tone in the lines, dots or patches of ink or colour which is to be reproduced, so that the negative may be the equivalent of a stencil—either opacity or transparency. If, say, a pen and-ink drawing was made with some lines sketched in a weak ink, the effect of the process would be either to lose these

lines altogether or bring them up to the same level of blackness as the strongest lines. If in combination with the lines of a pen-and-ink drawing a wash of some colour lighter than black was put in, the process would bring up this colour solid black or leave it out. Should we try to reproduce a photograph by the "line" process, the shadows and high-lights or whites only would be rendered when we came to print the negative on the zinc plate previous to etching. An example of a portrait without half-tones is a silhouette. Thus the point to be remembered in distinguishing between "line" and "half-tone" is that in the former process there can be no half-shades—nothing, in fact, between black and white, nor between high-light and shadow, unless the effect is produced by lines or dots. Why this is so will be understood from the fact that a layer of ink spread on a printer's roller must be of uniform thickness and will be also spread uniformly by applying the roller to a printing surface.

To Produce the Effect of a Photograph

we should require to lay the ink thickly in the shadows and more or less thinly in the half-shades, whilst no ink at all should be deposited in the whites or high-lights. Naturally we might cut away the portions corresponding to the high-lights, but how could we get the delicate gradation from high-light to shadow? The first idea which would naturally occur to the experimenter would be that such a difference could be obtained by a gradual tapering down from the level of the block to the white or non-printing portions. This actually is the basic feature of the Woodburytype process, in which the relief is proportional to the tones of the

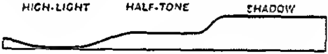


Fig 1.

photograph, the shadows being sunk the lowest and the high-lights being the highest portions of the printing surface (fig. 1). The result is that when a thin ink is poured over the printing surface and a sheet of paper with a hard backing is squeezed into contact with it—the surplus ink oozes out at the margins and leaves the proper quantity attached to the paper. The result is a sort of ink relief—the shadows having a thick deposit, the half-tones a semi-transparent deposit and the high-lights the thinnest possible film. This was a most logical solution of the half-tone difficulty, but the process of printing was too slow to meet practical needs. The press was something of the nature of a copying press and the printing almost as slow as the operation of copying a letter. A disadvantage was that the titling could not be printed with the picture, and white margins* could not be obtained, the print having to be trimmed like a photograph close to the picture and mounted. Thus

The Ideal Way of Reproducing the Half-tones

of a photograph proved not to be the most practical.

Since, then, it is not possible to have varying relief in the printing surface nor varying thicknesses of ink, we must make a compromise on the basis of the "line" process, endeavouring to represent our lighter shades by stipple or lines of varying degrees of fineness. W. B. Woodbury, the inventor of the Woodburytype process, sought to do this by interposing a ruled screen, or crape, gauze, etc., when making his relief plate, but this only had the "chopping-up

* By a modification of the process it is now possible to obtain prints with white margins, but the printing has not been quickened. A machine very similar to the Johnston Die Press would have saved the process from practical extinction

effect" to which I have already referred, the picture losing half its tone and detail. A much more promising attempt to utilize the Woodbury relief was by Charles Petit, in Paris, in 1878. He took a cast from the gelatine relief in a white plaster-like substance, but of such a nature that it could be cut into lines with a V-shaped graver, first in one direction and then across, so that pyramidal-shaped dots would be left. Previous to cutting, the plaster cast was blackened. Naturally when the plaster relief was highest the tool penetrated deepest and therefore left the smallest dot point at the surface. Similarly in the shadows where the dot was highest the tool hardly touched and therefore left broad-surfaced black dots; or if it did not touch at all—simply skimming the surface—there were continuous black shades. The result was a picture in dots which could be used as an original to photograph from, exactly as any other black and white copy by the "line" process. Petit had hit upon

The Correct Principle

which should govern the formation of the dots in half tone blocks, viz., that the dot should be a more or less truncated pyramid—an inverted V with more or less of the point cut off. Thus (fig. 2).—

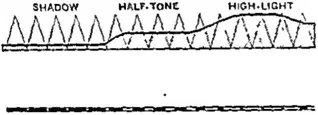


Fig. 2

Of course it would not do to cut the relief itself into dots and use it as a printing surface, for the simple reason that the dots would be of varying height and only the highest would print. By re-photographing the cast all the dots were brought to a common level.

F. E. Ives, of Philadelphia, who claims to have worked simultaneously on this principle, though he did not patent his method till 1881, proceeded in a different manner, though starting on the same basis—the Woodbury relief—which he covered with an even film of ink and pressed against it a white surface bearing the Λ-shaped grain. The result was more or less flattening out of the grain; and where flattened out most the greatest amount of ink was taken up. The process was afterwards modified by using an elastic sheet with Λ-shaped points on it. These latter became more or less flattened out and accordingly received a varying amount of ink. The impression received was transferred to a sheet of white cardboard, which was used as the "copy" for the photographing, producing the half tone effect by the "line" process.

These ideas were ingenious, but they were roundabout, slow and probably uncertain, as all processes depending on gelatine reliefs must necessarily be. I do not think Petit's process ever came into commercial use, and the Ives process was only practised for five years. Ives, no doubt, very early saw the drawbacks of his process; and he set to work to find some more direct method of producing the dot effect, his efforts resulting in the discovery of the principle which he has aptly described as the "optical V," the

Dots being Produced by Means of a Cross-line Screen.

For the benefit of readers who are not familiar with the present-day half-tone process, I may describe this as a glass plate, bearing black lines crossed, so as to

THE FLOWER MARKET

From a Pencil Drawing by
W. GAUSE

leave transparent squares. This is placed in front of the sensitive plate on which the negative is to be made and, so to speak, sifts the light into as many pencils as there are spaces in the screen, each pencil forming a dot (*fig. 3*). The simplest way of looking at the matter perhaps is to consider that light which is reflected from a white part of the picture forms a pencil of light of the greatest intensity, whilst from a shadow part of the picture the opposite is the case. Now the former will produce the greatest effect on the plate and consequently the largest dot, whilst the latter will be feeble and only produce a small effect, resulting in a small dot. Other intensities will produce various sizes of dots corresponding to half-tones.

Before pursuing the Ives' principle further I ought, in justice to other pioneers in the process, to hark back to the beginnings of photo-engraving methods, so that it may be seen how the early experimenters led up to the screen method.

Even so far back as the days of Daguerre and Nièpce attempts were made to etch photographic images in order to form printing surfaces.

Nièpce, with His Light-sensitive Bitumen

spread on plates of pewter, found it possible to get an image and that the light-hardened bitumen was impermeable to acids, so that he could bite in the plate

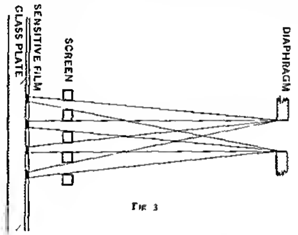


Fig 3

and make the dark portions stand in relief, but it is not recorded that he attempted to translate tones into relief. His experiments were confined to reproducing the lines of an engraving by exposing the plate through it. Had he been able to impress his plates with a photographic image he would have found, as did several experimenters who tried to etch the Daguerrotype image, that the half-tones were lost, or at any rate they were unprintable.

It was undoubtedly Fox Talbot who had the prescience to see how, by an ingenious compromise, the half-tones could be rendered in engraved plates. Having invented the Calotype process of photography, by which a negative was made on sensitive paper, and from that a print also on sensitized paper, he found that these photographs too frequently faded. It was probably due to this fact that he induced an engraver named Bradley, who was of some eminence in his day, to translate one of his photographs (a view of Melrose Abbey) into an engraving by the usual methods of hand work. The result was very satisfactory, being more faithful than the general run of engravings, and possibly the success of this engraving set Fox Talbot thinking; it may be that the idea of photo engraving was floating in his mind, leading him to attempt to produce a similar result by photographic means. He no doubt perceived that the way in which the engravers

obtained their translation of lighter and darker tones was by thicker or thinner lines, by placing them nearer apart and by cross-hatching and stippling. At any rate, he conceived the idea that if he placed a plate ruled with lines between the sensitive metal plate and a photographic positive transparency, he would bring his photograph into some state analogous to a steel or wood engraving.

W. H. Fox Talbot

Accordingly in his patent of 1852

Fox Talbot Makes the First Suggestion,

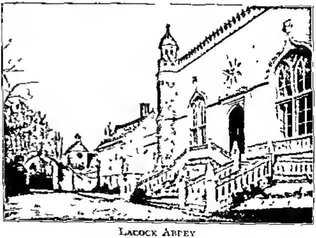
so far as history records, to break up the tones of a photograph by means of a screen of ruled opaque lines on glass, and he also describes the alternative of muslin, crape, gauze, etc., also a method of dispensing with the screen by laying a resinous dust ground. In the same patent is described the use of a mixture of gelatine and bichromate of potash as the sensitive film, and the etching of the plate with perchloride of iron. These ideas form the basis of the present-day photogravure process. The idea of applying the screen to the sensitive copper plate has been repatented several times; and even to this day is the "secret" of some jealously guarded photogravure processes.

Although Fox Talbot took out his patent in 1852 he had been working on experiments with a view to engraving plates by photographic means from 1843 onwards, so that he undoubtedly antedated every other experimenter.

It seems remarkable that at such an early date he should have so clearly grasped

The Essential Principle of Photo-engraving,

not only in regard to the use of a screen, but also as to the most suitable sensitive surface, the laying of a grain and the etching of the plate with perchloride of iron—all of which methods are in use to-day, only modified in detail. The fullest justice has not



Lacock Abbey

been done to the memory of Fox Talbot, who was undoubtedly an original investigator and in many respects a remarkable man. His results, too, were practical and complete—not crude experiments. Only last year some of his engravings on copper were unearthed by the editors of the *Photogram* and excellent prints obtained from them. The remains of this father of photo-engraving, originator of this most "wonderful process," are interred in the Cemetery of Lacock in Wiltshire, about a quarter of a mile from Lacock Abbey, where he lived—a place which ought to be the Mecca of every photo-engraver who is a lover of his craft.

Fox Talbot was followed by many other experimenters, first amongst whom must be mentioned M. Berchtold, a Frenchman, who took out a patent on the 14th December, 1857, in which he distinctly specified the use of a glass plate "coated with a substance impermeable to light and covered with a multitude of very fine parallel lines close together, made by means of a pointed steel tool, which removes the substance without cutting the glass." He also describes the method of

Turning the Screen at Right Angles or Otherwise,

so as to cross the lines. This anticipates the idea which Swan and Meisenbach patented many years afterwards, though it must be said in justice to the two latter inventors that Berchtold does not mention the use of the screen in the camera, his method being to impress the lines on a bitumenized or bichromated zinc plate after the photographic image is printed. He describes his screen as a "sort of photographic graver" for tinting or shading the photograph in lines, after the style of the steel or copperplate engraver.

C. J. Burnett followed up the ruled screen idea by suggesting in 1858 the use of crossed lines instead of making a double exposure to secure the crossing.

A claim has been put forward in favour of Baron F. W. von Eggloffstein as the inventor of the half-tone process; but though he may be credited with its introduction into the United States he cannot be regarded as an original inventor, for the published description of his method shows that it is identical with that of Berchtold. Moreover, it does not appear that Eggloffstein was pursuing experiments earlier than 1861, and he did not take out a patent and publish his results until Nov. 21st, 1865, whilst Berchtold's patent is dated 1857. Eggloffstein had been an officer in the Prussian army and had only migrated to America shortly before the time of his experiments being made. In 1866 the two sons of Kossuth, the Hungarian patriot, were at work on a similar process and described the use of screens of fine lines ruled upon glass with a diamond point on glass.

In England, E. and J. Bullock, a firm of photographers at Leamington, took out a patent in 1865, which embraced the use of a ruled screen and of muslin, gauze, etc. They also appear to have been the first to announce the idea of

Placing the Screen in Front of the Sensitive Plate

in the camera. This latter fact must be regarded as a most important step in the history of the half-tone process, for undoubtedly this was the foundation of the present-day half-tone process. The method of impressing a ruling separately from the image on the plate to be etched, though adaptable enough for intaglio printing, would never have led to the perfection which has been now attained in relief half-tone blocks.

It was soon seen that the use of the screen in the camera was the right method, and other experimenters were very speedily at work on it, notably J. W. Swan, the veteran chemist and electrician, better known to the world perhaps as the inventor of the carbon filament in the incandescent lamp. He patented in

1879 the method of turning a single-line screen during the exposure so as to obtain the effect of a cross-line screen. Although

Meisenbach

is generally credited with the process he did not take out a patent until 1882, embodying a similar idea of turning the screen; but all honour must be given to him as the first to popularise and bring the half-tone process to a practical commercial success. From this time onwards the half-tone process was worked as a business, where before it had never emerged from the stages of laboratory experiments.

A fact which I wish to impress at this point is that up to this time the half tone process as we now know it had not actually been invented. All these early experimenters seemed to have aimed at simply cutting up the picture into lines or dots—the "chopping-up" method which so many believe even to this day to be the principle of the half-tone process. That is why all the early half-tones were "mincemeat" pictures, which frequently provoked such expressions as "raspy effect," "those irritating dots," "the damned wire screen effect," "those gauzy pictures," "that Berlin woolwork effect," "looking as though they were taken through a veil," and so on. The fact was that in "chopping up" the picture into dots half the picture had been chopped out. It was the same as would be the case if a photograph was cut through vertically and horizontally with a tint of white lines. It was like a picture seen through a veil or screen and a good deal of hand work had to be put on to the block to make the result passable. Indeed Meisenbach forced his process into popularity by the amount of skilful hand-work with the graver, burnisher and roulette which he applied to the blocks. By studying the needs of printing—and especially the poor printing of that day—Meisenbach overcame the prejudices of printers and made a great commercial success of his process.

We can now revert to

"The Ives Principle"

and turn to America for the further progress of the half-tone idea. This part of its history is, indeed, the most important. Zinc etching in line was practised in America very soon after it had spread into use in Europe. Gillot described his process at the Paris Exhibition of 1867, and from that date onwards the process came rapidly into extensive use. It had reached the highest point of success at the time when Meisenbach blocks became popular; and every step forward which the half-tone process has made seems to have proved one step backward for the "line" process.

It will be seen that Ives must have had plenty of suggestion from the European experimenters on the use of the screen, yet he improved on the idea in a quite original way. It was based on Petit's idea of translating the tones into dots of varying size and on the method which Ives had already been working, as already described; but the necessity of making the relief and replica from it was done away with, the peculiar dot effect required being produced in the negative by means of the ruled cross line screen. It may be urged that Ives is not entitled to the credit of the earliest use of the cross-line screen, but he claims the use of the sealed cross line screen, in which a pair of parallel line systems on glass are crossed and sealed between the glasses. Workers of the early methods of half-tone could not conceive how such screens could be used, because they fancied the screen must be closer to the plate than the thickness of the glass would allow for.

The Ives principle permitted an appreciable distance between the screen and the plate; and indeed it was found to be a distinct advantage to have

KNITTING FISHERWOMAN.

From a Painting by HOBSE SMITH

& Van Santen

A Screen Distance.

Later investigations elaborated the practice of distancing the screen, and tables of screen distances which were published* showed that the screen distance bore a definite relation to the extension of the camera and to the size of the lens aperture, as well as to the size of openings in the screen. Figs. 4 and 5 show in diagrammatic form the effect of screen distance. In the one case it is merely a masking or chopping-up effect, whilst in the other there is a perfect graduation of dot.

I need not go more deeply here into the influence of the diaphragm and screen distance. Suffice it to say that modern half-tone negative making owes its success to a suitable combination of screen distance and diaphragm (lens aperture). The correctness of the principle of the optically-formed Λ dot was soon demonstrated by experience; and from the time of the introduction of the cross-line screen method, about 1888, the history of the half-tone process is simply a

Fig 4

Fig. 5

record of the progress towards perfection of this idea. The cross-lined sealed screens used by Ives were introduced commercially by

Max Levy,

who brought them to the highest degree of perfection by engraving the lines into the clear glass and filling with a black pigment. M. Wolfe also, by a different method, has for some years past produced excellent screens, and there have been several imitators of these two pioneers in screen manufacture.

The theory enunciated by Ives was followed by many investigators of the highest eminence, amongst whom I may mention Dr. Eder, of the Technical High School in Vienna; E. Deville, the Surveyor-General of Canada; the late Dr. Grebe, of the Zeiss Works, Jena, and previously associated with V. Turati, in Milan; A. A. K. Tallent, of the Polytechnic School of Photography; the late W. B. Bolton, the joint inventor of the Collodion Emulsion Process; and U. Ray, of Calcutta, whose admirable articles in the YEAR BOOK have shown not

* See "*The Correct Screen Distance in Half-tone Negative Making*," by myself, with calculations by J. A. C. Branfill, in PROCESS YEAR BOOK for 1896. Afterwards re-published in booklet form "No. 2 Penrose Pocket Book—the Half-tone Process," now out of print and superseded by "No. 5 Penrose Pocket Book—the Half-tone Process, with Penrose Patent Diaphragm System."

D

only a clear grasp of the subject, but have suggested new methods of work.* It would seem to-day that there is nothing further to be discovered in respect to the half-tone dot and we can only go on gaining skill and improving our apparatus to the utmost limit.

Most helpful to the half-tone method was the discovery of

The Enamel on Fish-Glue Process

for making the print. It is attributed to an Englishman named Purton, now dead, who was working at a photo-engraving establishment in Philadelphia. He was experimenting with an old process found in some back number of one of the photographic almanacs, by which a copper-plate was coated with a mixture of gum, bichromate and sugar, which when dry was exposed under a negative, and the resulting print had the property of attracting a powder more or less according to the lights and shades of the picture. The story runs that he overheated one of these plates and, being unable to remove the print from the metal by any solvents, it occurred to him to use it as a resist. The results were so promising that it became a regularly worked process, until someone discovered that fish glue could be used instead of gum and that the powder need not be used at all. An English photographer named Hyslop, who was working in the States some time about 1892 or 1893, has probably as good a claim as anyone to the origination of the fish-glue idea.

By means of the enamelled gum or fish glue, enabling the direct print from the negative to be used as the resist for etching, the original size and sharpness of the dots was retained instead of being thickened with ink and resin, or partially etched away by the acid.

The Use of Copper

led to perchloride of iron being adopted as the etching mordant, also tending to maintain the sharpness of the dots.

Finally, the improvements in printing the blocks have largely influenced the success of the half-tone process. For several years it had to contend against imperfect machinery, unsuitable rollers, bad ink, poor paper and the deep-rooted prejudices of the printers.

But the process was right; all difficulties have been surmounted and all prejudices lived down, so that the half-tone stands to-day on a footing such as no other method of engraving has ever attained; and not only has the process been improved in itself, but it has had a large influence on the improvement of printing machinery, of paper, ink and printing methods. It has led to greater cleanliness and care of machinery in the printing office and improved the quality of printing all round. Worn out and inartistic type faces could not be tolerated alongside the clean and precise half-tone, and shoddy printing could never have a place where half tones had to be used.

But, most wonderful of all, the half-tone method has brought

The Three-Colour Process

out of the stage of laboratory experiment and rendered it capable of practical applications; so that in a few years we may expect to see our books, magazines and newspapers with illustrations printed in colours.

Again, by a modified method the half-tone principle has been applied to steel and copper engravings, revolutionizing—shall I say also ruining—an old and artistic profession, just as the regular half-tone ruined wood engraving by superseding it.

Even the charming process of photogravure has been cheapened, and I hope it will not be said degraded, by the introduction of the half-tone principle into

* See article in present issue on "Automatic Adjustment of the Half tone Screen."

the formation of the grain, thereby enabling the copies to be printed on fast running power presses instead of the slow old hand presses.

Further, who can measure the influence the half-tone process has had upon art? The process has been often declared antagonistic to artistic ideas, yet it has set up a race of artists and draughtsmen who have made it their business to draw for process, and have certainly found it more lucrative than the pursuit of art for art's sake, as in the old days. It is probable, too, that the process has

Brought Artists into Closer Touch with the People,

popularizing their works and not improbably tending to widen the circle known as "the art-loving public." The works of great masters in the art galleries of this and other countries have been made familiar to the public, in form at least, if not in all their wealth of colour; and this must have created a greater love for pictures and a greater desire to see the originals of these reproductions. The colonial in the far up country can see in illustrated home journals the reproductions of the choicest works in the Academy, and be acquainted, by means of pictures, with the course of current events within the older boundaries of civilization.

The features of celebrated people are familiarized to the whole world; and views of famous places, accessible perhaps to only the few, may be seen by multitudes who may never be able to visit them.

Science has been no doubt advanced by the publication of photographic illustrations of the most unimpeachable fidelity along with the text of scientific works, rendering the latter not only more interesting and instructive, but possibly more easy to comprehend.

Commercial firms have been able to advertise their wares in a way that was never possible in the old days when wood engraving and lithography were the only available processes.

Who can measure, either, the influence which the half-tone process has had upon photography itself? We know that

Photography has Advanced by Leaps and Bounds

concurrently with the progress of the half-tone process; and we may fairly assume that the familiarizing of the public with photographic illustrations in the illustrated press has led to the extensive popularity of photography.

There can be no doubt that the half-tone process most happily met the needs of the times; it was just the process to suit the bustling life of the latter end of the nineteenth century—a process which kept to the pace of the social life of the people at a time when mechanical, electrical and chemical progress had changed the whole conditions of living, compared with the days when wood, steel and copperplate engraving sufficed for the illustrative needs of mankind.

The world now moves faster and is ever wanting quicker methods. The camera has replaced the artist and draughtsman for purely record work, whilst the acid bath and the routing machine have replaced the graver, just as the linotype machine has replaced the compositor where rapid type-setting is wanted.

Undoubtedly Time will also bring changes in the half-tone process, which will inevitably tend to become more and more mechanical where it is applied to such purposes as newspaper illustration. A self-adjusting process camera will take the negative, which will be mechanically developed, dried and printed. Levy's acid blast machine will automatically perform the etching, and a combination machine operated by one man will do the finishing of the block. The whole process will probably be carried through in half an hour or less.

It is even possible that the screen negative making and

The Etching will be Entirely Done Away with.

We do not know how far we must reckon with such a machine as Amstutz's

Acrograph, which is slowly progressing towards greater and greater perfection. In that case the newspaper photographic negative would be printed straight away on to carbon tissue by electric light, the carbon relief put into the Acrograph and the machine would do the rest, turning out a relief plate on celluloid which could be stereotyped or electrotyped.

Whatever the future brings forth it surely cannot be gainsaid that the half-tone process, which has already accomplished so much, is a wonderful process. What a pretty idea it was of splitting up and assorting the rays of light, so that on the negative a big dot was made where the light was reflected most strongly from the picture, a medium-size dot for a medium strength of light and a tiny dot for the feeblest rays—these being reversed in the print, so that white was represented by tiny pin-points like dots, half-tones by well-rounded dots, which gave the modulation, and shadows by big dots closing up into blacks.

Familiarized as I have myself become with the half-tone process by years of reading, study, experiment and practice—and by having thousands of blocks through my hands—I can never lose my admiration for the

Marvellous Optical and Chemical Phenomena

upon which it is based, and which have been evolved by the untiring—and for the most part unrewarded—work of scores of experimental and practical workers, during the fifty years (nearly) which have elapsed since Fox Talbot's first patent was taken out. In 1902 the process will attain its jubilee; and an exhibition which would show the present position of photo-mechanical processes would be a fitting way of celebrating the event and of doing honour to the memory of the father of process engraving—William Henry Fox Talbot.

THE HAYMAKERS

Block by
Meisenbach Co.

Photo by
H. C. [illegible]

FORBES ROBERTSON AS HAMLET

Half Tone Block by
W. C. Keene.

Direct from Painting by
J. Gulich, R.I.

FOUR BY HONOURS

Half-Tone Engraving by
The London Etching Co.

By Permission of Henry Graves & Co., Ltd.,
the Owners of the Copyright
and Publishers of the Engraving

LORD ROBERTS

Block by
UNIVERSAL PROCESS CO.

Photo by
ELLIOTT & FRY

LORD MILNER

Block by
RHEINLANDER & Co

Photo by
ELLIOTT & FRY

THE FLOWER SELLER.

By permission of the Proprietors of "L'Art Decoratif"

Facsimile Block by

From a Pencil Drawing by

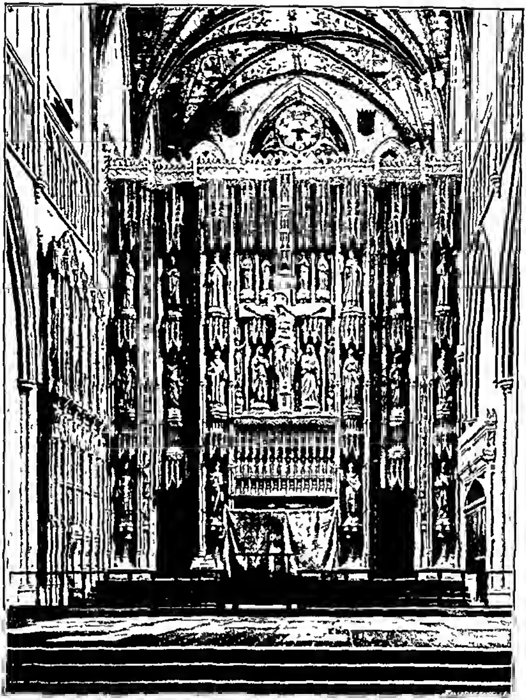
By kind permission of
J. M Dent & Co ,
Bedford Street, W C.,
Reproduced in
Facsimile Process by
The Strand Engraving Co , Ltd

From the New Edition of Thackeray's "Vanity Fair"

ECCE HOMO.

Example of Work done with
Wheeler's Metzograph Screen

Block by
J. Löwy, Vienna



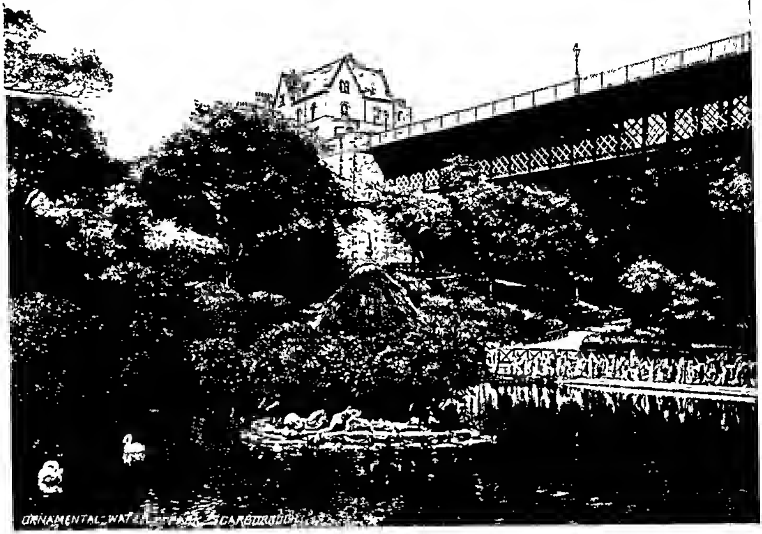
WALLINGFORD SCREEN.

St Albans Abbey

Half-Tone by
THE SALVATION ARMY

Photo by
CAPTAIN REAL

Design and Block by
Wallace & Gilbett,
Birmingham



Specimen of
Autochrome Printing.

By Permission of
Liversidge, Ross & Co., Ltd., Bradford

Process Work in Hot Climates.

By Major-General J. Waterhouse, I.S.C.

A Family Group

Photo by
Byrne & Co.

THE Editor has asked me for a few words regarding the differences of procedure required in working the various photo-mechanical processes in hot climates, and I shall be very glad if the few hints I am able to give may be found useful.

First of all, it must be stated that there is no typical tropical climate, unless the equable damp heat of the insular and maritime regions near the Equator, where it is never cold and never really hot, and the mean temperature is about 84° F. all the year through, can be so considered.

I have entered fully into the question of tropical climates in my pamphlet on "Carbon Printing in the Tropics," published by the Autotype Company, and need here only remark that the worker in the tropics has four distinct types of weather conditions to deal with.

(1) The cool season, when the weather is fairly cool and dry. The day temperatures may be fairly high, ranging from 60° to 80°, with sometimes very low night temperatures.

(2) Ordinary hot weather with temperatures from 90° to 100° during the day, with a greater or less drop up to about 10° at night, humidity varying according to locality.

(3) Excessively high temperatures from 100° to 120°, with great dryness and low humidity during the hot months at inland places bordering on deserts, and far removed from the influence of the sea.

(4) The warm, moist atmosphere prevalent all the year round in the equatorial maritime regions, and during the rainy season inland. There is a great excess of humidity, the air sometimes saturated. The temperature during the day ranges from 85° to 90°, and higher.

The climatic changes accompanying the three seasons are often very regular, and can be anticipated within a few days, so that the experienced process worker will be prepared to alter his formulæ accordingly.

During the cool season conditions are more or less similar to those prevailing in European climates, and no very special precautions are necessary, though chemical activity will be retarded if the cold is excessive. In some places very dry, and in others very moist, cold conditions may prevail, and have to be provided for.

As the hot weather approaches and the heat increases, chemical action will be heightened and accelerated, and may require checking by the use of retarding agents and weaker solutions. Printing and transfer inks and other similar

waxy and resinous compounds will be much softer than in the cool season, and must be hardened by increasing the proportion of the harder ingredients. Only such gelatine dry plates can be used as have been hardened to enable them to withstand a temperature of at least 90° without melting or reticulating. On the other hand, there is danger in very hot and dry weather of gelatine films, especially collotype skins and heliogravure resists, flying off the plates. Carbon tissue and bichromated gelatine papers become brittle and less sensitive in very dry, hot weather. The excessively dry, hot weather is in many ways the most trying time for process workers.

During the rainy season, though the temperature seldom exceeds 95°, and is often much cooler, the excess of moisture has to be guarded against. Care has to be taken to keep negatives from being stained in silver printing. Carbon tissue and bichromated gelatine papers dry with difficulty, they cannot be kept for more than a day or two before use, and are liable to stick to the negatives while being printed. Unsensitized carbon tissue and plain gelatinized papers must be kept hermetically sealed to prevent them from becoming insoluble by the action of the heat and moisture. They also have to be preserved against mould and fungus.

Process workers using the wet collodion process will do well to use a collodion containing a full proportion of alcohol at least equal to the ether. Nitrate bath about 7 per cent., kept acid. Iron developer fully acid, and sufficient to keep the lines clear. The plate must be backed with wet blotting paper or felt to keep it moist during long exposures.

Working with gelatine dry plates, hardened brands should be selected. When possible, development should be done early in the day, before the air gets heated. When ice is available developers and washing waters may be cooled down with it. An alum bath should be used. The writer generally used an acid fixing bath, which seemed to have a hardening effect on the gelatine.

Gelatino-chloride printing papers have to be carefully handled in hot weather. Some brands are hardened, and will stand washing and toning without ice, but others are much too soft, and can only be used with iced solutions.

Carbon tissue, whether for pigment printing or heliogravure, requires different sensitizing solutions in hot and cold weather. The writer found that Husnik's formula for the bichromate bath, containing alcohol and ammonia, was useful. In hot weather the sensitizing solution should be cooled down with ice before use. The proportion of bichromate should be reduced to about 2 per cent; the proportion of alcohol (rectified spirit) should be increased from 10 to 25 per cent., according to the temperature and humidity. It renders the gelatine less soluble, and favours the quick drying. Two per cent. of ammonia solution may be added in hot, damp weather, and reduced to ·5 per cent. in cool, dry weather. It helps to keep the tissue from decomposing and becoming insoluble, while drying slowly. Carbon tissue is best dried face downwards on glass plates, in a box containing chloride of calcium. The use of glycerine with gelatine and alkaline bichromates is undesirable.

In preparing bichromated gelatine paper for photo-lithographic transfers, more gelatine and less bichromate should be used in hot weather, and some ammonia may be added with advantage. The solution of gelatine and bichromate is best applied with a brush. Transfer inks should be stiffened by the addition of asphaltum, wax and hard fats.

For zinc printing keep the damping solution iced, and add a little glycerine during very hot, dry weather.

The above hints comprise most of the special difficulties met with in tropical working, but their application must depend on local and climatic conditions only to be learned by experience, and no definite instructions can be given.

Half-Tone Without a Camera.

By J. A. C. Branfill.

AS I understand that a process in this direction has been exploited on the Continent, it may interest some readers of the PROCESS YEAR BOOK if I repeat my views on that subject as published in *Process Work and the Printer* in May, 1896, and endeavour to make them plainer.

I then said, "I make a direct transparency from an original negative, and from this form a grained negative by contact in a printing frame behind a cross-line screen, securing the necessary distance between the positive and the screen by means of cardboard packing. As a source of light I use a Hume's Enlarging Lantern at about 18 inches distance, which gives a circle of light just covering a ½-plate." The diagram, fig. 1, shows the relative positions of the different parts. It may be pointed out that the front lens of the lantern objective is not shown, because I often remove it, but not of necessity.

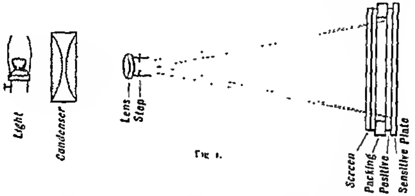


Fig. 1.

I generally use a square stop set at an angle of 45° with the screen lines, or a square stop with two adjacent angles continued by circles, fig. 4, as I advised in the YEAR BOOK for 1897, p. 88. With regard to this I may say (with apology for digressing) that in my opinion the extension of the square stop on two adjacent corners is sufficient for the uniform extension of the dot in the direction of the screen lines, as the two adjoining screen openings supply the deficiency. The extension openings may thus be larger than the usual ones and less diffraction may be looked for.

As to the distance of screen from the faces of transparency and plate to be exposed (which are in contact), it is calculated precisely as in the tables that I worked out for Messrs. Penrose & Co., depending on the size of diaphragm and the distance of the sensitive surface from the same.

In the article referred to, at first, after stating plates used, etc., I gave details as to printing plates and etching, and said, "I use copper plates and form the resist on them just as in photogravure, using the Autotype No. 3 tissue made for that process. The effect of exposure can be seen during the printing. As the image is divided into spots no grain need be laid on the copper; in other respects I proceed with mounting and etching in the same way as in photogravure."

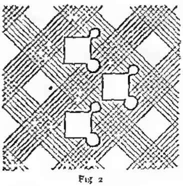


Fig. 2

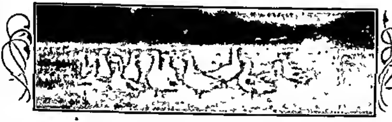
After recommending a deep bite and some other etching details, I said

"In the above process no reversal of image is required, but if we want to make an intaglio we must have a reversed grained positive, which may be obtained precisely as above from an ordinary reversed negative."

"Before etching an intaglio plate it is necessary to varnish the edges exactly up to the printing edge. This stopping I prefer to do by light rather than by hand, which I accomplish thus: I cut out an opening in a piece of brown paper, $\frac{1}{8}$ of an inch larger all round than the print is to be eventually, and the grained positive is adjusted over this in the printing frame. When the tissue is placed face down, pencil marks are made on the back of same corresponding with marks or lines on the brown paper mask above-mentioned, and the exposure proceeded with. By the time the tissue is sufficiently exposed I have ready a neatly-trimmed shape in non-actinic paper, the exact size of proposed print. After removing the grained positive from the frame a sheet of glass is put in its place without disturbing the mask, and the non actinic shape is placed on the glass centrally over the opening in the brown paper mask, showing $\frac{1}{8}$-inch clear space all round. The exposed tissue is then laid down on this in its original position, which the pencil marks before-mentioned make an easy matter. The printing frame is screwed up and placed in diffused daylight for about ten minutes or so, according to light. The remainder of the process is the same as for relief plates. . . . ."

"It will be seen that, with the exception of the screen, no other plant is required than that to be found in most amateur photographers' possession."

The above briefly-described process, being of the same nature as photogravure, is necessarily a somewhat slow one, but I believe that good results can be obtained by it with less technical skill than other methods require. Another advantage is that no copying camera or reversing prism is required. The only use of the lantern is to obtain a beam of light of sufficient size and to confine the light to that beam only. The process is well suited to the requirements of photographers who can make transparencies from their own negatives and then make the printing surface, getting the trimming and mounting type-high (when necessary) done by the trade, which has been my own practice. Further, in my opinion, the quality of print resulting is superior to an ordinary process print produced with as little skilled labour.



Block by
Rheinlander & Co

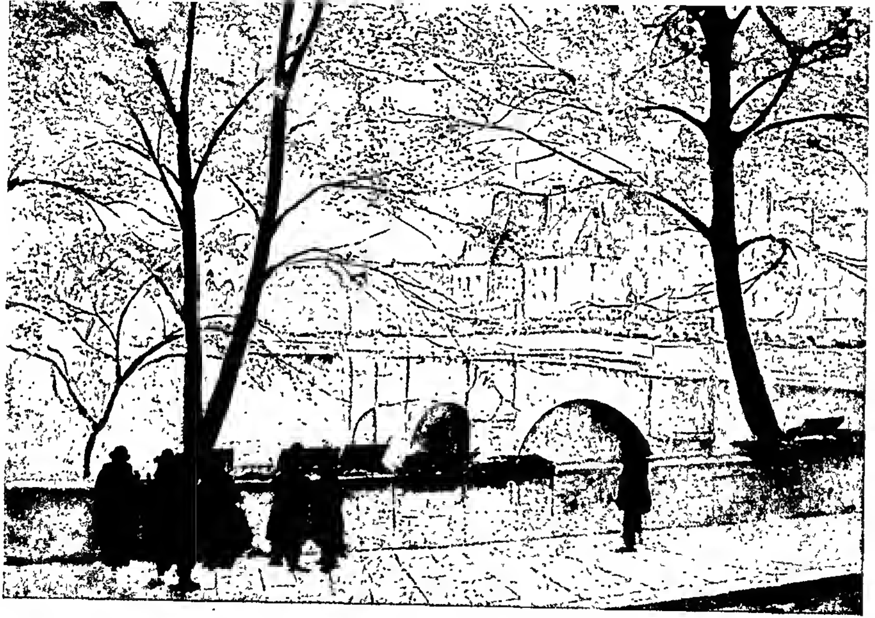
A Study of Geese

Photo by
Ernest W. Philpott.

"AN' MELISSY AN' ME, WE LAUGHED FIT TO BUST"

Photograph by
HANA, Strand, W C

From the Christmas Number (1900)
of *Pearson's Magazine*.



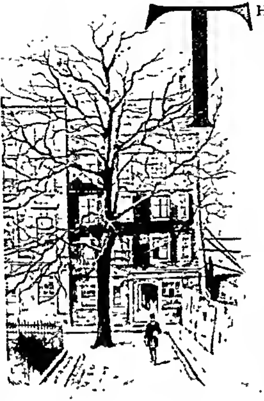
THE OLD BOOKSELLERS BY THE PONT NEUF, PARIS

Three Colour Blocks by
HENTSCHEL COLORTYPE CO.

From a Water-Colour Drawing by

Colour Curves and Pigments.

By C. G. Zander.



A BIT OF OLD LONDON—CLEMENTS INN

Photo and Block by W. C. KEENE.

THE reminder of the Editor of the PROCESS YEAR BOOK to the writer that a new edition was being prepared, was accompanied by a suggestion that his contribution should embody an opinion on the controversy between Mr. Ives and Mr. Howard Farmer, which was carried on for some months in the *British Journal of Photography*, and was the outcome of Mr. Ives' Traill Taylor lecture, delivered last winter before the Royal Photographic Society.

There has been a good deal of misunderstanding in this controversy, which deals with some of the more intricate problems of three-colour work, a subject which is somewhat complicated and full of pitfalls; in fact, I may say it is ground where the angels fear to tread. Therefore, I prefer to deal with the subject of the principles involved in three colour work, particularly as far as they relate to the inks, independently, in my own way, and leave it to my readers who have not followed the controversy to read it up, and to form their own judgment. My article, I need hardly state, is founded on a lengthy practical experience, and the advantage I have had of discussing the whole matter with most of the principal workers, both scientific and practical.

Three-colour printing is based upon the well-known and scientifically-established fact that all colours of the spectrum, and, it should be added, the extra-spectral hues of purple resulting from the combination of the red and violet ends of the spectrum, can be reproduced by mixtures of three monochromatic lights, red, green and violet, in proportions (so far as the spectrum colours are concerned) indicated by Maxwell's colour-mixing curves (fig. 1).

In order to condense the subject I must take it for granted that the reader is familiar with the fact that it is possible by means of colour-sensitive plates, combined with selective colour filters, to analyse the colours of any given subject, and to produce photographic records which practically correspond with these colour-curves: and that, for typographical purposes, positive blocks are made from these negative records, and printed in inks which, generally speaking, may be called complementary colours, or which Sir W. Abney aptly termed minus colours, from the fact that they should be colours which reflect all the rays of the spectrum, except the one which in three-colour work is recorded by the

negative, namely the red, the green and the violet respectively. Thus, taking the red negative, the positive made from it will be printed with a colour reflecting all the spectrum rays except red, which is cyan blue (a kind of peacock blue). Taking the green negative, the positive made from it will be printed in a colour reflecting all the spectrum rays except the green recorded by the negative, this positive or printing colour being pink (magenta). Likewise, the positive made from the blue-violet negative will be printed in the colour reflecting all the spectrum rays except the blue-violet, which is yellow of the hue of the D line of the spectrum (primrose).

We may take Maxwell's colour-curves as our working basis, although, as will be explained further on, it is necessary to depart from the curves, partly owing to the inks not fulfilling the theoretical conditions required for ensuring perfect results, and partly because the colours are produced by subtraction, and not by addition. This applies particularly to the permanent commercial inks, and in a less degree to the "theoretical" (fugitive) aniline lakes, whilst for projection in Ives' Kromskop Maxwell's curves will be found adequately correct.

We will leave further considerations of the colour-curves aside for the present, and will at once proceed to the selection of the inks required for printing the positives.

It is generally stated that the three printing colours should be the

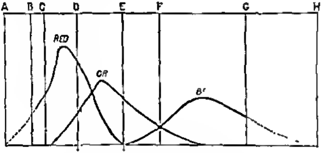


Fig 1 MAXWELL COLOUR CURVES

complementary colours of the three primary colours recorded by the negative, a statement which seems correct at first sight, but is true only in a general way. The most suitable pigments will be those which are transparent in, roughly, two-thirds of the spectrum, and show an abruptly terminating absorption band in the third part corresponding with the main portion of the colour sensation curve transmitted by the relative negative.

The absorption bands of the three inks, when recorded or placed side by side, should extend over the whole of the spectrum. It is difficult to fix the exact position of the two dividing lines between the three absorption bands. They should roughly be about the D and F lines respectively. Although painstaking workers like Dr. Clay, who has made a special study of the scientific aspect of the reproduction colours, have attempted to determine the exact demarcations for the inks with respect to the spectrum, it is useless for the present to enter fully into the subject, as ideal pigments do not exist, nor does space permit to treat this subject fully in this article, but I would refer the reader who wishes to go fully into the subject to Dr. Clay's able paper. (See below.)

The red reproduction colour should be of magenta hue. It should absorb the green and be fully transparent to the red and violet with abruptly terminating curves about the D and F line.

The yellow reproduction colour should be transparent in the red and green,

and opaque in the violet, with abruptly ending curve about the F line. The hue will resemble "primrose yellow."

The blue reproduction colour should be transparent in the green and violet and opaque in the red, the curve ending abruptly near the D line. The hue will be a peacock blue.

It is a mistake to attempt to use pigments which transmit only narrow and very luminous bands in the red and violet (pink), in the yellow and blue portions respectively of the spectrum, showing correspondingly wide absorptions. Such pigments would not cover the whole of the spectrum. They would be very dark, saturated-looking colours, unsuitable for reproducing many intermediate hues. It is, however, better to err on the side of too broad an absorption, for then the colours would not be diluted with white light: otherwise they would be tints only, and fail to reproduce deep shades and black. Dr. Clay sums up the qualities necessary for correct inks as follows:—

1. The inks should each absorb one band of the spectrum in the red, green and violet respectively.
2. Must transmit the remainder unaffected.
3. Must absorb the whole between them,
4. For half-tone work the absorption must end abruptly, especially in the case of the pink and blue inks.
5. The limits of the absorptions should be so chosen that the added white (light) may be distributed through the spectrum as nearly as possible proportional to the luminosity of the spectrum.
6. The luminosity of the resulting colours in matching the spectrum should be as high as possible.
7. Need not be complementary to the colour sensations.

For reasons of (3) the absorptions must meet, for (2) they must not overlap—thus, (2) and (3) lead to (4).

The chief reasons for recommending steep or abrupt absorption curves are that variations in the quantity of the inks in the several impressions will not be so important, and that the colours will be much purer in hue, being diluted with less white light.

The ideal inks we have been considering will be represented by the following diagrams:—

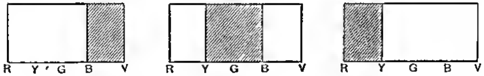


Fig 2 The supposed absorptions of the proposed theoretic inks

I have long advocated the use of such ideal reproduction colours as defined in the foregoing statement, where permanency is of no object, and they have been practically tried. I will give their merits and defects, but must premise that it seems not possible to produce pigments even from amongst aniline lakes, which in every particular answer the scientific requirements of ideal inks, but only a very fair approach to the ideal may be expected. This refers particularly to the blue. The red and yellow of the set of "theoretical inks" which I supplied to Dr. Clay, and which he examined and reported upon in his paper, are as near the correct colours as can be produced at present. The experience of those who have practically tested such theoretical inks and have used them in conjunction with blocks made from negatives which, as far as possible, followed Maxwell's curves, is that the blocks require very little fine etching in order to produce a *facsimile* of

the original. They are the only inks which allow of a reproduction of bright violets, purples (magenta) and emerald greens, or of an adequate reproduction of the colours shown by iridescent glass or mother-of-pearl.

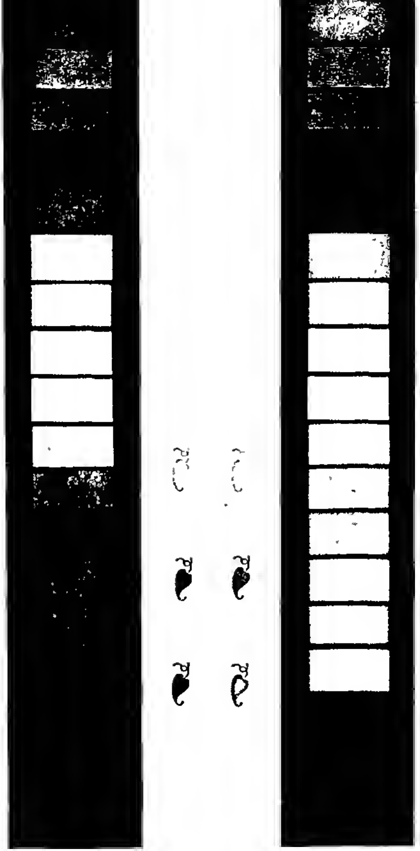
The reasons why it is impracticable to use such theoretical or scientific inks for commercial works are primarily their fugitive nature (yellow excepted). They answer for book illustration very well, but for show-cards, posters, or any printing exposed to light they are absolutely useless.

Amongst their defects are their apparent less covering power, compared with the ordinary commercial inks and the greater accuracy necessary in the flow of the inks to produce uniform results and the difficulty sometimes experienced in producing "dead" blacks.

The latter statement makes it appear that practical experience is at variance with the scientific theory, but can probably be accounted for by three principal reasons. First: that really correct ideal pigments have yet to be found. Second: that it is well-nigh impossible quite accurately to follow Maxwell's curves in the negatives. This is particularly the case with the red negative, the best colour sensitive plates being comparatively but little sensitive in the red, and when matters are forced by over-exposure the action in the yellow is too much increased compared with the red portion of the negative. This defect has usually to be corrected by faking or fine etching. One of the foremost practical workers and an eminent block-maker, who is well acquainted with the scientific aspect of three-colour work, replied to my query as to whether he followed Maxwell's curves, that he found it technically impossible in practical work to follow these curves with strict accuracy. Third: the reason that the permanent pigments usually employed for commercial work are easier to print and with less trouble give more uniform results is probably owing to the fact that they are of less luminosity, and often have steeper absorption bands, and, therefore, when the negative curves are fairly well adjusted to suit the inks, small variations in the amount of the ink will not materially affect the extent of this absorption, and, therefore, leave the resulting colour unaffected. But the possibility of reproducing pure hues is decreased in the measure in which the printing colours depart from the scientific standard.

I may here state that I found in practical work that in order to produce violet, emerald green and deep rich orange and scarlet reds by the superposition of the theoretical minus-colours, which should in purity and luminosity equal the minus-colours themselves, it was better not to print both the minus colours full strength. If printed full strength the resultant violet, emerald green, orange or scarlet is very dull or "dirty;" whilst if one of the two is printed a little more than half-strength, these mixed hues (practically the complementaries or primary spectrum colours) are more like the unmixed printing colours in purity and luminosity. I embodied my experience in a table which I handed to Mr. Gamble, of the Bolt Court School, a year or two ago. My experience has now been confirmed by Dr. Clay's researches, who has calculated the exact curves for ideal inks. For instance, in reproducing scarlet, if red and yellow are printed full strength orange will result, therefore the yellow should be reduced. It means that really to fully compensate for the resultant double absorption of the pigments when superposed thus, slight additions should be made to Maxwell's colour curves to add white light when taking the negatives; or, if that is not done, fine etching will have to be resorted to in order to compensate for the omission, if absolute accuracy in the reproduction of the colours of the original is aimed at.

The additional curves are necessary only in the red and blue violet negatives (blue and yellow blocks), and by a reference to the diagram (fig. 3) it will be noticed that their object is to lighten the blue ink in the violet portion of the picture and the yellow ink in the orange part of the picture. In commercial three-colour



Printed with Standard (permanent) Photochromic Inks.

Printed with Theoretic (fugitive) Photochromic Inks.

See *Colour Curves and Pigments*, page 17

Blocks by
Messrs. Hentschel Colourtype, Ltd.

Inks manufactured by
A. B. Fleming & Co., Ltd.

work these additional curves are omitted, and the corrections are made by hand (*fine etching*). *In three-colour* projection no such additional curves are required, the Maxwell curves being correct in this case.

	Magenta (Printing Colour)	Spectrum Red	Yellow (Printing Colour)	Green	Blue (Printing Colour)	Violet	Black.	White.
Red Negative should show	O	O	O	S T	T	S T	T	O
Blue Positive should show	T	T	T	S T	O	S T	O	T
Green Negative should show	T	S T	O	O	O	S T	T	O
Red positive should show	O	S T	T	T	T	S T	O	T
Blue-Violet Negative should show	O	S T	T	S T	O	O	T	O
Yellow positive should show	T	S T	O	S T	T	T	O	T

O = opaque
T = transparent
S T = semi-transparent

The above table expressed in curves (according to Dr. Clay)—curves representing action on plates (fig. 3).

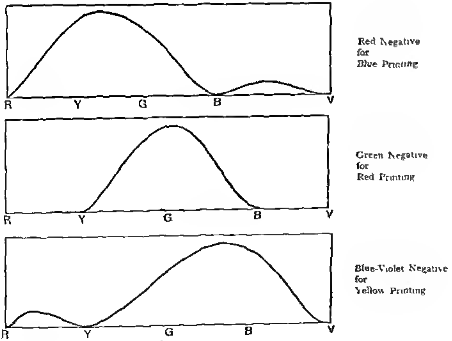


Fig 3

So far we have considered the application of Maxwell's curves in conjunction with scientific standard pigments to three-colour printing. For commercial work, such as posters, show-cards, almanacs, in fact all printing which is likely to be exposed to direct sunlight for any length of time, the use of the theoretical inks is quite inadmissible, on account of the fugitive nature of the red and blue colours. The correct red and blue pigments of the desired hue and luminosity can only be produced by having recourse to the use of fugitive aniline dyes.

If permanent colours are required a totally different class of pigments have to be used, and an unavoidable departure from the correct hues has to be made. These alterations in hue and luminosity again necessitate corresponding alterations in the colour curves when taking the three negatives.

The usual method employed by three-colour block-makers is to make up a set of colour filters which, in conjunction with colour sensitive plates, produce red, green and blue photographic records of the object to be reproduced, without any strict consideration of a systematic or scientific colour analysis, and the inks are then suited to the blocks as well as possible, by empirical methods. Consequent incorrect renderings of the colours of the original are corrected by faking, i.e., fine etching.

Constant practice enables the fine etcher to perceive at a glance where to make the corrections, so as to get fairly close to the original, at least as near as it is possible with the pigments used.

The proper method, however, if permanent pigments are to be used, is to select the inks first and adapt our filters to them, so as to produce such curves as will give the best possible result.

As to the selection of the inks, let them approach the theoretically correct inks in hue and luminosity as near as possible. The chief faults of nearly all the three-colour inks on the market, when spectroscopically examined, is that the red reflects too much yellow and too little violet, i.e., it is too scarlet. The yellows are fairly right, but the blues are too opaque in the green and of too low a luminosity. That means that both the red and blue are unsuitable for reproducing bright purples and violet, and the blue is unsuitable for reproducing bright greens.

If in the selection of our inks with reference to permanency we have to depart materially from the scientific standard in one colour, we must make a corresponding alteration in the other two colours. If the red printing colour transmits a greater percentage of yellow and less violet, then the yellow and blue pigments must be so chosen as to restore the equilibrium, if I may use that term, between the three colours. In such a case the yellow should be more transparent in the green and the blue pigment more transparent in the violet, i.e., their mean absorptions should be equally shifted as the mean absorption of the red pigment, so that the three absorption bands should not overlap. To put it another way: If we arrange the spectrum colours and extra-spectral colours round a circle in a recurring range, and if we select a permanent red pigment the mean absorption of which is a few degrees removed towards the violet-blue from the mean absorption of the theoretically correct (minus green) red, we must select a yellow and blue the mean absorptions of which are removed a corresponding distance from their respective correct mean absorptions. With a red of a more scarlet hue we must use a more greenish yellow and a more violetish blue, i.e., more approaching the tone of ultramarine. This departure from the correct standard should not be greater than is absolutely necessary with a view of using permanent pigments, for the greater the deviation the smaller becomes the range of pure hues obtainable from the superposition of the three colours and our ability to correctly reproduce the colours of the original.

The deviation from the theoretic standard colours necessitates a corresponding alteration in the colour-curves when taking the negatives. Generally speaking the negatives should he most transparent in that part of the spectrum which corresponds to the densest part of the absorption band of the printing ink selected for the printing of the corresponding positive (block), and the transparency of the negative should gradually taper off or diminish towards the middle of the absorption band of the other two printing colours. It will be difficult, if not impossible, to adhere in practice to scientifically correct curves with regard to the use of the ordinary commercial, i.e., permanent inks. In any case let the best possible inks be selected first and the filters and plates be adjusted to them afterwards, and not *vice versa*. Even with the best commercial inks a good deal of fine etching will have to be resorted to—but here my task ends.

Fine etching has become almost a fine art, and has been reduced to a system. A skilful fine etcher is an artist, and a most valuable and indispensable assistant to the three-colour block-maker. Where nature fails art steps in.

Whether the theory of trichromatic photography as propounded by Mr. Ives is correct or not, the means at our command to carry it out in practice, as far as typography is concerned, are at present inadequate. We must, therefore, make a compromise by keeping as near to Mr. Ives' theory as our present pigments and methods of printing will permit. In doing this it will be as well to follow Mr. Howard Farmer's advice, and to first choose the most suitable inks, and next to adjust our filters and plates so as to follow curves which will produce a colour analysis which will accord with the selected pigments, and give results which require the minimum of correction in the shape of fine etching. For the rest we must then still trust to our skilful friend the fine etcher.

As a practical illustration of this article, I have had a colour chart reproduced both in the permanent commercial inks and in the fugitive theoretic inks. The original chart comprises the principal colours of the normal spectrum and the extra spectral purples (minus-green reds). The colours were selected with the greatest care from amongst aniline colours of great purity and luminosity, and are remarkably good presentments of the real spectrum colours—I may say the best it is possible to procure.

The reproduction produced from blocks such as are usually supplied for commercial work, and which are made with due regard to the requirements of the permanent commercial inks, fail, even with the best possible skill of the fine etcher, to produce the purples, blues, violets and greens of the original. The fugitive theoretic inks, with much less fine etching, approach the original as nearly as it can ever be hoped to attain by typographic methods; and are a very good *facsimile* of the hues and range of the colours of the original chart.

I have much pleasure in acknowledging the interest and pains Mr. A. T. Clarke, of Messrs. Hentschel-Colortype, Limited, has taken in reproducing the chart so as to be printed in the two sets of inks from two sets of blocks, and to serve as a practical illustration of this article.

Whilst writing this article the interesting news has been communicated to me that a new process of chromo-typography is being worked in Germany, which uses the theoretic inks, and supplies their defects (permanency, of course, excepted) by a fourth grey or black printing. This process is reported to be different from similar four-colour processes worked before, and is worked in conjunction with typographic blocks made by a new method, but as I have not received full particulars or seen specimens of work I am unable to pronounce an opinion, and must content myself by simply mentioning the fact.

Those who wish to make a further study of the scientific principles on which three-colour work is based cannot do better than consult the following works —

"Colour Measurement and Mixture" (Abney).

"The Colour Sensations in Terms of Luminosity" (Abney) Phil. Trans. 1899.

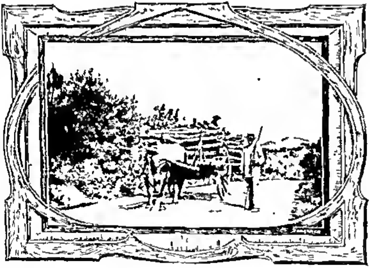
"Dreifarben Photographie" (Hubl).

(I do not know whether there is an English translation of this excellent book.)

"A Handbook of Photography in Colours" (Published by Marion).

(I would specially refer to the second section, most excellently treated by Mr. Tallent.)

"On the Application of Maxwell's Curves to Three colour Work" (By Reginald S. Clay, D.Sc.).



A French Wood Cart

Block by
W F Sedgwick, Ltd

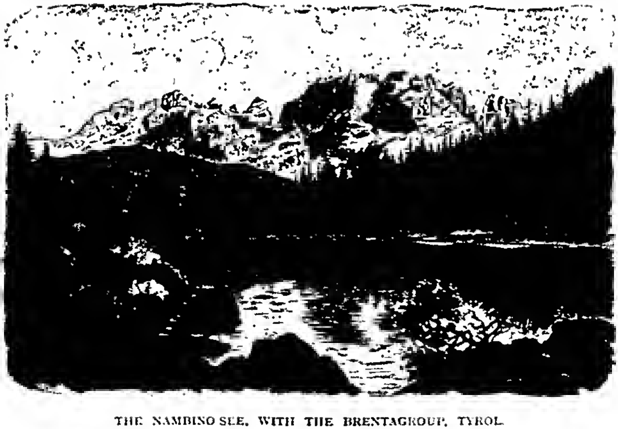
Photo by
P. Rochussen.

MY HUNT.

"*Then there was a ball in the evening, for dancing I presume,*
balls generally are, but I never had a chance,
all the men wanted to be my partners at the same time,
and quarrelled and fought over me till I could have cried
Besides, there were the other girls, they never even looked at them
A nice position to place me in"

From the Christmas Number (1900)
of Pearson's Magazine

THE BRENTAGROUP, FROM THE KAISERIN FRIEDRICH PLATZ, TYROL



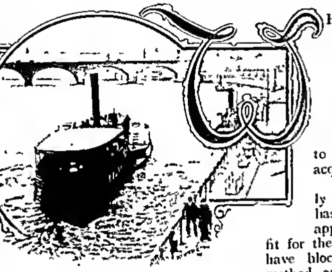
THE NAMBINO SEE, WITH THE BRENTAGROUP, TYROL.

Three-Colour Blocks by
Brend'Amour, Simhart & Co.,
Munich Düsseldorf.

From Oil Paintings by
C. M. Reisch

Process Work and the Lantern.

By H. van Beek, Berlin.



...ck by
...e Arc Engraving Co., Ltd.

Photo by
J. Macaigne.

WHEN the leaves are falling and long evenings make their appearance, the photographer sits down and prepares to convert the best results of his spring and summer work into that form which allows of his giving an amusing couple of hours to his young people and old friends of his family—indeed to all lovers of nature within his acquaintance

This lantern, which until recently was only used for amusement, has now, however, become a useful apparatus for producing illustrations fit for the books of giants. We can now have blocks by our well known screen method, only with the slight difference that every dot in the new process takes perhaps thirty-fold the space of its brother in our older method, and yet destined to produce fine art illustrations.

In short, blocks of perhaps four feet can now be made where the older method gives only a few inches. Really these blocks are fitted for the use of giants, but, as we do not meet with those hypothetical Goliaths of Gulliver's in these days, we must be content with a perfect and paying compensation for the suggested use of such giant pictures by utilising them for posters, show bills and other advertising sheets on walls of theatres and other buildings, as well as on all those places which modern advertising has been able to deface

Looking from pure process standpoint, it is strange that such a method of producing illustrations of large dimensions, purely on a photomechanical basis, should have taken so long to make its appearance.

It is far from our desire to withdraw our sympathy for good old litho work in black and colours, however much those untasteful, fantastically drawn and inartistically coloured figures on many a show bill of to-day may offend our common good taste. It is not easy to believe that the people producing such often malproportioned figures in coarse litho work are brethren of the men of the lens and screen in the same grand guild of applied graphic arts.

On the old process basis it would have been impossible to produce posters of the size under notice. The screen must be dimensioned to the size of the posters, often some feet square. This would be a costly, dangerous thing to handle on account of the risk of breakage, besides being costly in the manipulations of negative making. Others tried another way, apparently very promising. They took an up-to-date, finely finished process negative with sharply cut dots and good-sized lights, and enlarged this picture. However, cutting away the blurred fringe of our exposed and developed dot in our process negative of to-day's practice is a bad point in the process principle. The blur represents tone values; with an increasing number of lines to the inch, the blurred edge takes up a

larger part of the dot. The finer our screen the greater percentage we must cut away from our fine dot. It is not, therefore, a good plan to enlarge a bad result in dimensions, as it must give rise to screeny effects and holes in the shadows of our enlarged picture. Our "cutting the dot" must be made on the final negative, so that the screen must be exposed in a similar way. By this means a fair step in the direction of true tone values of large prints was undertaken, and gave rise to the following method.

From the original picture an unscreened or ungrained negative is taken in the usual way on a dry plate or some other sensitive surface, on such a scale that

Specimen of Poster Grain

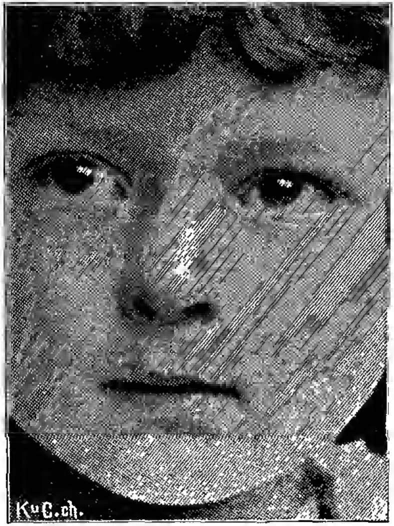
Produced by the Process of Gigantography

Block lent by Klimsch & Co

by combining this negative or its positive with a given screen the enlargement desired will give a good process negative with proper screen qualities. Once the scale of reduction is fixed, our negative is taken without screen, and an ordinary slide for the lantern is made on a slow plate. This slide is placed directly behind the strongly lighted condenser of our enlarging camera.

Once focussed it is obvious that any screen grain in direct contact with the slide would give a perfectly sharp screen negative of the qualities we know from former practice, with dots equal over the whole plate, only strong or faint in density. If we move the screen from our slide we see at once all the screen

effects we need in our modern process work. Dots block up high-lights; they decrease in shadows, leaving only a strong centre. The blur in the half-tones and shadows must be cut away, whilst the blur in the lights is blocked up to opacity by intensification. Just as nowadays, only in a much more simple manner, for our blurred fringe is now better under control of the eye. The screen brought into the right position, we cap the lens with a yellow screen and place the



Specimen of Poster Grain

Produced by the Process of Gigantography. Block lent by Klimsch & Co

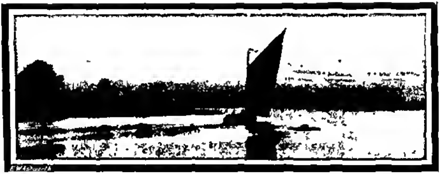
process dry plate in the right position. Exposure, development and other operations are well known and we need not repeat them here. In this way we get a good process negative of large size with only a small screen.

The end of the century brought us two inventions, relating to process, of the utmost interest to advertising firms, both doing honour to practical men of

English and German process studios. The first is the well-known "Wharf Litho," enabling cheap illustrating of advertising posters and show bills in black and chromo to be produced on ordinary letterpress machines; the other, the above-described German process, introducing the clean, well-proportioned lens image into the advertising picture. Both together may do wonders.

The new methods entail all that is necessary to produce good, cheap and agreeable-looking wall pictures for all purposes.

The process is extremely interesting, and the results are still more so. The illustrations we give furnish a good idea of the effect. The method is patented so far as business interests are concerned, so that the inventor's claims are secured and licences to work the process are granted on reasonable terms. However, every process student in the world may, if he chooses, experiment with the method to gather many practical hints, relating to stops, distance and other things, for ordinary practice. The enlarged picture on the screen enables a careful study of all these things—pinholes or whatever they may be—to be made in a more effective way than the best modern process camera we remember to have ever had in use.



EVENING ON OULTON BROAD

Block by
E. W. ASHWORTH

Photo by
J. BROWNING

FROM A MINIATURE

Three Colour Blocks by
The Strand Engraving Co., Ltd.

Reproduced by kind permission of
Langfier, Ltd.

Stripping Collodion Emulsion Films.

By Joseph Scholefield.

THE OLD FASHION

Block by SALVATION ARMY. Photo by BYRNE & CO.

NOW that the capabilities of collodion emulsion are beginning to be more appreciated by operators, a few remarks to the uninitiated may be of interest. I allude to the possibilities of the emulsion film in its application to various purposes where the ordinary plate negative would be of no use whatever. In America it has been, and is, practically demonstrated that the film negative is a matter of economy, inasmuch as a large number of process negatives can be cut up and fitted into position on one large piece of zinc; etched altogether, afterwards cut up and mounted in usual way, the favourite material being the benzole rubber solution. The weak point in any of the stripping film formulæ is the time required for drying—a power-driven fan helps this somewhat.

The standard method with gelatine formulæ of the German workers, though taking from twelve to twenty-four hours in drying, is simple, practical and of the greatest utility; and for the particular class of work where the stripping film would be of most use, time is not always such an important factor. No more need be said on that point.

In France and in Russia there are to be seen books published with most exquisite illustrations mingled amongst the text, with all the appearance of photogravure prints—some with addition of one or two tints, but in reality fine collotype work, and if the truth was sought for, the feasibility of such work is dependent entirely upon the stripping film.

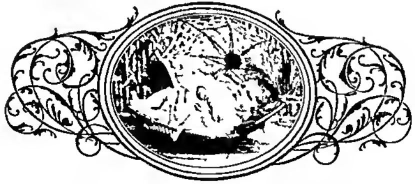
The lithographic printer has to fit in his transfers to suit various positions on large sheets of his work—in the same way as the typo. printer suits his blocks to the various positions in his forme. Why not the photographer in making up his large combined negatives? A series of valuable negatives can be stored; getting rid of the glass is an advantage needing no comment.

Now for a few practical hints in the matter of manipulation. The glass on which the emulsion negative is made should be perfectly cleaned, then rubbed over with talc (French chalk) with a final good polish (this is to prevent the film adhering to the glass), and round the edges for ¼-inch, coated with benzole-rubber solution. This is quickly done with a small camel-hair brush tied to the side of a piece of stick, the object of this edging of the plate being to prevent the developer getting under the film; otherwise the film of emulsion would break up or float off the glass. When the negative is all fixed and finished and dried, it is ready for the stripping solution. First coat over negative with a solution one

part gum arabic, 20 parts water; dry, and then apply the melted gelatine solution.

Gelatine	60 parts
Water	500
Alcohol	100
Glycerine	12

The manipulation is somewhat influenced by the proportion of water to gelatine. If too thin, an edging of stout paper would be needed round the plate ¼ inch high. This is not required when the solution is of right consistency. The glass should be warm, also the gelatine. The best way to coat the plate is to place on a levelling stand, measure off the proper quantity of the melted gelatine solution (once determined, the various quantities for different sized plates can be noted down), pour on the left-hand end near the corner, then with the side of the little finger of right hand spread backwards and forwards, at the same time tilting the plate with the left hand until it flows evenly to the other end. If it sets too quickly before this is done either the plate is too cold or the solution, or both. When coated right across replace on the level for a quarter of an hour or so, until it sets. Then it can be placed edgeway up, preferably in a dry current of air, to dry of its own accord. When *thoroughly* dry all that is needed is to cut round, and the film will strip from the glass of its own accord—and should be as flexible and pliable as a piece of leather.



LEFT OUT IN THE WET

Block by
SALVATION ARMY

Photo by
BYRNE & CO

The Aerograph in Lithography.

By Charles L. Burdick.

DOORWAY AT FREJUS

Block by
GILCHRIST BROS.

Photo by
AGNES B. WARBURG

PICTURES are for the most part a sign language. We represent by a line the place where in Nature one object shuts out another from the vision. But in Nature this is differentiated by colour, by contrast of light and shade and also by the consciousness of perspective, which is produced by looking at the objects with two eyes from different points of view.

When we look at the line in a picture we think of what it represents in Nature, much in the same way as when we see in print the word "rose" and think of a particular kind of flower.

The difference is only one of degree. We have no pigment which will paint the rose and no trick by which to produce the perspective.

In this sign language we have lines and shadows (leaving colour for the moment out of consideration), and it is of shadows or methods of producing planes of shade that I wish to speak.

Shadows are made in many ways. They may consist of a succession of lines, or any combination of lines, or they may be a multiplication of fine dots, or they may be made of a solid body of colour.

Recently we have seen a new method of making shadow or tints creep into picture production; I refer to splashes of colour. The method is being used for both poster work and drawing for reproduction.

It is doubtless prompted by the artist feeling, which wishes to get away from the regularity of line and stipple.

The Japanese, a most artistic people, have for a long time used a method for spraying colour for decorative effects, but the mechanical west has gone one better in the way of tools for the work, and we are now sending our Spray machines to them.

I wish to describe briefly some apparatus which has been recently designed for use with the Aerograph to control the texture of the spray or splashes. It is in line with modern ideas of eliminating the element of chance and producing uniform results.

When liquid, as colour, is distributed by a jet of air, the particles will be broken up and distributed more finely on the paper as the force of the jet of air is increased: that is, a low-air pressure will produce a coarse spray—a high-air pressure will produce a finer one.

A difficulty heretofore experienced in using the spray method for lithographic work has been that, whereas a large portion of the splashes might be coarse enough to print well, there would be a proportion broken up so finely as to produce a bad result by the ink uniting these small specks together.

The accompanying illustration, which I will now describe, will show our

Three Colour Reproduction, from Oil Painting, by
ELYCTRO-TINT ENGRAVING COMIANY, Philadelphia. Pa

JUST OUT

In fig. 2 is given a series of four tests made on the same kind of plate, but each with a different set of screens, "the small letters indicating the colour of the glasses forming the sensitometer." In No. I. there is a deficiency of action with the red screen, over the white, green and red squares, while the green screen passes too much blue, but not sufficient yellow green. In No. II. the screens employed transmitted three narrow bands in the spectrum, with the result seen while No. III., although apparently fairly correct, allows, in the case of the green filter, too much blue to get through, and in that of the blue filter too much violet. With No. IV. it may be said that we have obtained screens correctly adjusted to the plate, as the squares are, as nearly as possible, equal in density throughout. The absorbing glasses thus *found* can now be used *for photographing the row of* coloured glasses in order to see whether we can reproduce them in hue and luminosity by means of the three chosen colours, "the inner part of the instrument being removable for this purpose."

The value of a system of this kind should now be apparent and an instrument based on this principle* ought to be very useful in the hands of those engaged in tri chromatic photography

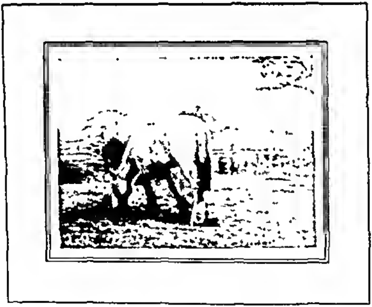
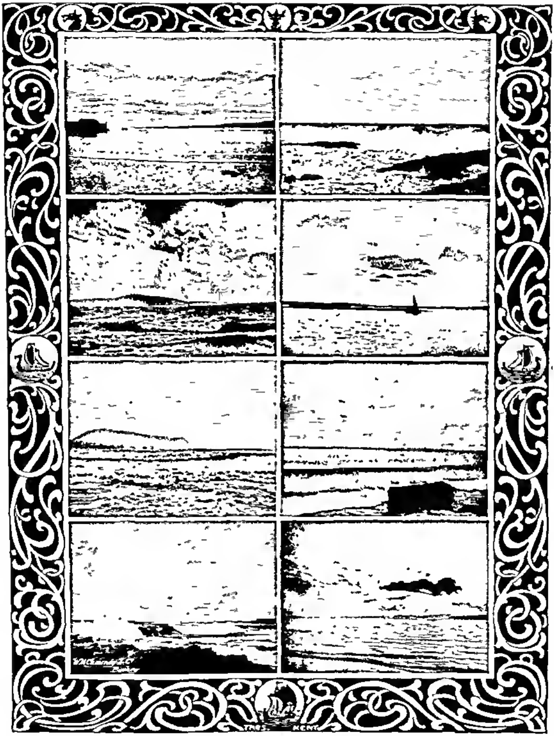


Photo and Block by
W. C. KEENE



ORCADIAN SEASCAPES

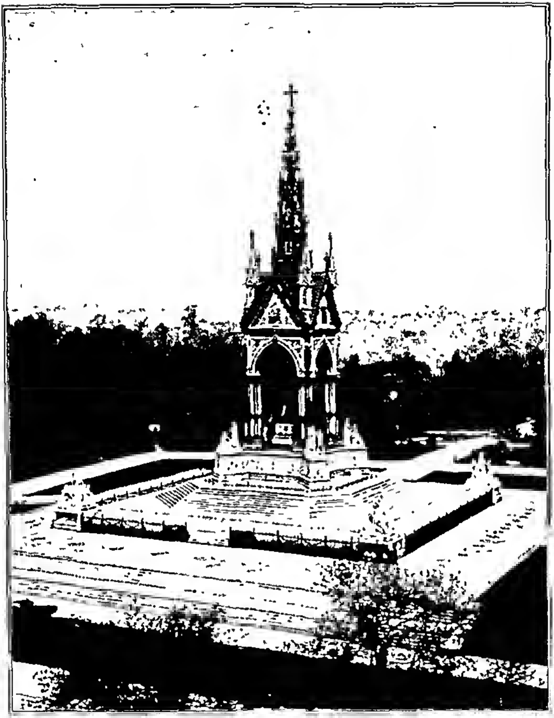
Block by
W. M. CHAUNDY & Co.

Photo and Design by
THOS KENT, KIRKWALL

PORTRAIT STUDY.
Mrs T. Eyre Macklin

Block by
F. W. Ashworth.

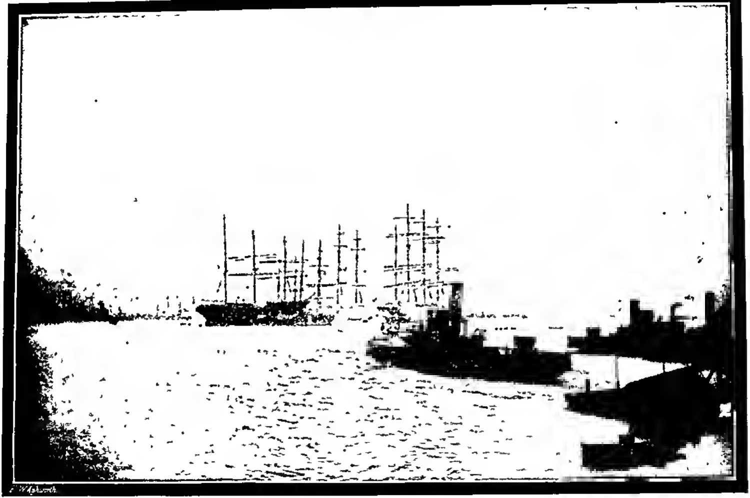
Photo by
David Blount.



THE ALBERT MEMORIAL

Half Tone by
Pawson & Brailsford

Photo on National Dry Plate by
F. G. O. Stuart, Southampton.



THE TYNE.

Facsimile Half Tone by
E. W. Ashworth.

Photo by
D. Blount

OLD IRISH LOW-BACK CAR.
At Glenshesk, Ballycastle, County Antrim.

Block by
W. and G. Baird, Ltd., Belfast.

Photo by
R. Welsh, Belfast

PORTRAIT STUDY

Designed and Engraved by
The Photochrom Co., Ltd

A PARISIAN ACTRESS.

Mdlle Charlotte Wiehe.

Half Tone Etching by
A E Dent & Co

Photo by
Reutlinger, Paris

STILL WATERS

Block by the
Half Tone Engraving Co., Ltd.

Photo by
Welch & Sons, Portsmouth

Photo-Lithography in Half-Tone.

By E. H. Frewing.

DAD'S HAT.

Block by CLARKE ENGRAVING CO   Photo by H C LEAT

GOOD even-surfaced paper of a good quality is coated by floating on a mixture as follows—

Nelson's flake gelatine	16 ounces
Chloride of calcium*	3 ..
Water	100 ..
Glycerine	4 drops

These should be mixed as follows: Get a jar holding three quarts, one with a wide top; first put in the gelatine and water cold, and allow to soak for two or three hours. When the gelatine has soaked, put the jar in a saucepan of water and heat over a gas stove until the gelatine is dissolved. Do not let the water in the inner vessel (the jar) boil. When the gelatine has dissolved, stir in the glycerine and lastly the chloride of calcium; this should now be strained, through a flannel bag first dipped in hot water and then wrung out, into a dish contained in another holding hot water that is kept to one heat, nearly boiling. The solution is now ready for coating the paper in the following manner:—Float the paper on the solution for about three minutes, or until it lies perfectly flat on the solution. It must be raised in about one minute to see if there are any air-bells underneath, and if any they must be removed. The paper must now be dried in a drying cupboard, or room heated to 70°F. The paper will take some six to eight hours to dry, and will keep any time in a dry room. When required for use it must be sensitized in the following solution. It may be either floated or immersed in the solution; I think the better way is to immerse the paper, as in this way you can sensitize more pieces at one time (as in the case of carbon tissue). Leave in the solution two to three minutes.

The bath is as follows:—

Bichromate of potash	2 ounces
Chloride of sodium (common salt)	1 ounce
Ferrocyanide of potassium	200 grains
Water (preferably distilled)	60 ounces

This is not sensitive to light until the paper is dry, therefore the paper can be *sensitized in the light and put to dry in the dark-room, the temperature being kept* at 70°F. When dry it is ready for exposure, and may be printed under a ordinary good negative. Print about three to five minutes to sunlight or its equivalent; this from a medium negative. The best negatives for this work are rather thin with plenty of detail. To judge the exposure look at the print, and the image will show as a dark fawn colour on a yellow ground. After the print has been removed from the frame (in the dark-room), it is now laid in a bath of cold water for about ten minutes, then taken out and laid on a zinc plate and the water dabbed out with paper (blotting paper that is not fluffy is best), or a soft clean sponge will do. The print will now be granulated, and is ready for inking-up. The following is a good ink:—

*The chloride of calcium is the graining medium, and can be varied in quantity for coarser or finer grain

Virgin wax	2 ounces
Stearine	2
Common resin	2
Russian tallow	1 ounce

Melt in a saucepan (glazed) over a gas jet or on a hot plate, then add :—

Chalk printing ink	16 ounces

Add spirits of turpentine to thin down to the necessary consistency. A piece of Turkey sponge is charged with this mixture, and rubbed lightly over the print. You can now see the grain in the print. Take a letterpress glue roller with a small quantity of the ink, and the paper is then carefully rolled up until the picture is clean. A quick, sharp stroke removes the ink, and a heavy pressure deposits ink, thus a heavy roll will deposit the ink in the shadows, and a quick light roll will remove the ink from the unprinted parts of the transfer. Hence, when carefully rolled up clean, a grained transfer is the result.

The transfer is now put in a weak solution of tannin (or well stewed cold tea) and bichromate of potash for a few minutes, then dried off with blotting paper and hung up to dry. After drying, expose to light for two minutes.

To damp the transfer for transferring, use a weak solution of oxalic acid (1 in 80) applied to the back of the print. Now lay in damping sheets until the stone is ready for receiving the transfer.

Lay on a clean, well aired litho stone, or litho zinc plate, cover with a clean sheet of paper and hard backing sheet, pull through twice, then reverse the scraper and repeat, do not increase the pressure after the first pull.

Now take off transfer without damping, and the ink will remain on the stone. Having lifted the paper from the stone, gum up the stone, and after a few hours roll up in the ordinary litho manner for printing. Do not wash out with turps, and use middle litho varnish to thin down ink.

Several prints may be pulled from the above transfer if required by inking up the transfer again each time. In this case it would be better to omit the bichromate of potassium and the final exposure, or use a very dilute solution, only enough bichromate to just colour the solution, say 1 in 500 parts, and print one minute.

HOOK NORTON, OXFORDSHIRE

Block by
A. E. DENT & Co

Photo by
GODFREY BINGLEY

Trade Prospects in Australia.

By S. W. Bacon, Sydney.

MERRY

Block by CLARKE ENGRAVING Co Photo by G BREMNER

ALTHOUGH process work in Australia has much improved during the last year or two it is still much below what it should be.

This in a large measure is due to the inability of the printers, who, as a class, seem to think that half-tones should print with the same facility as line, and that the block-maker is the man who should be held responsible for everything and should so turn out his work that such a thing as a make ready would be quite unnecessary. In fact, if simply a clean pull is obtained, even if the shadows are grey, the process worker considers that he has been fairly treated. The usual result, however, is an unsightly daub of ink. It is obvious that blocks so handled will show little or no difference between first-class work and the most ordinary rubbish; and the man who has paid for good work feels that he has been fooled and for the future goes for cheaper blocks, arguing that they are quite as good. Nor is he wholly wrong, for under existing conditions it is hardly worth while paying for good work.

There are, of course, a few printing houses that do turn out good work, but the general average of both etcher and printer is far below what might reasonably be expected. The best engraving houses find that their trade is gradually leaving them and going to a herd of small men—one man and a boy, or a man and his wife and daughters, who, thinking the game a good one, run a little place on some roof, the superb climate enabling them to do their photography outside. They take their "beno" when it rains. These people take work at any price, generally from 2d. to 4d. per inch and simply rush half-tone through. They don't seem very anxious about line, the former being easier—one negative. It matters little if the high-lights are cross-lined or if the shadows are solid. Get a print of some sort and one etch merely deeper than the plate. A proof is quite a superfluous luxury. Bevel the edges with an old file and tack it on to a piece of wood and the 2d. per inch is finished. The printer will improve matters; inferior ink, inferior paper and inferior everything else, and the customer humps his shoulders and goes away, if not contented, at least determined that he is not going to pay as much next time. I think my friends the printers must have had a very rosy time in years gone by, but competition is becoming keener, and in time they will no doubt learn that process work and the correct handling of half-tones is of vital importance to them and that the only way to ensure readers and constant custom is to do their work intelligently and correctly. ' "Good enough" never yet won a battle and they have a long way to go before they become good. At present a 150-line screen is quite beyond them.

But to return to the process trade. It must be remembered that the volume of trade in any one city is very small. The entire population of Australia is considerably less than that of London and they are very widely scattered. Gum trees and kangaroos unfortunately do not require the services of a zinco man, so

that there is no justification for the establishment of a really big up-to-date house, and meanwhile the twopenny dodger lives and does harm.

Business is improving, it is true; and no doubt in time we shall come into the first rank—only it seems a long way off.

To add to our joys there is the tyranny of our cultured and rampant democracy, who, not content with a drastic Factories Act, are now fixing minimum wages. Here is a sample:—

Minimum wage for a half-tone etcher, £4 per week; line etcher, £3 per week. Minimum wage for "negative maker," £4 per week—that is, any fool who can take a line negative must not receive less than £4 per week. This is the Factories Act of Victoria! The plague has not yet reached New South Wales, but, of course, it may come. How all this is to be got out of 4d. per inch may perhaps be learnt from our sapient legislators, or their no less sagacious masters the Labour party.

However, apart from all this, life out here is not unpleasant; and with strict attention to business a decent living may be made, but no fortune, at least at present.

And it is a decided gain to be away from the dreary drizzle, fog, smoke and dirt of mighty London.

Facsimile Half-tone by CARL HENTSCHEL, LTD.

HARBOURED

Photo by D. BLOUNT

A DREAM OF YOUNG SUMMER

Reproduced by Three-Colour Process by
HARPER & BROS. ART DEPARTMENT, New York

From *Harper's Magazine*

The Reproduction of Half-tone Blocks by the Electrotype Process.

By George E. Dunton, Boston, U.S.A.
Editor of the Journal of Electrotyping

AN OLD HOMBURGER

Block by VAUS & CRAMPTON. Photo by J. C. WARBURG

THE *half-tone does not present the* bugbear to the average electrotyper that it does to the ordinary printer. There is a very large majority of this latter class, I am sorry to say; who are unable to produce creditable results from the engraver's original blocks, while from the electrotyped reproductions they develop only botcherly daubs. On the other hand, the electrotyper does not always reproduce from the original a duplicate which would do credit to it. I believe that it would be impossible to produce by the commoner processes of electrotyping a duplicate from the ordinary half-tone block that would be an absolutely perfect reproduction. But it is possible by careful, zealous treatment of the work throughout all the different manipulations of its handling; to produce a duplicate which will, under the same conditions; give an impression so nearly equal to that from the original that the difference can only be detected by the trained eye of the expert. If the half-tone etcher could anticipate the slight amount of thickening which must from unavoidable causes result between his original and the electrotyped reproduction, then it would be possible for the electrotyper to duplicate every detail of varying light and shadow with truthful exactness.

The lack of this common understanding between the engraver and the electrotyper proves one of the most serious obstacles to the more general usage of the trichromatic or three-colour plates, from the fact that they cannot generally be duplicated successfully by the common electrotype processes. The least deviation in the depth of one of the colours from that of the original plate; especially if it be one of the stronger colours, the red or blue; completely spoils the entire printing. If it could be possible to make the engraver comprehend that necessarily there will be a slight thickening of the electrotype and that by carrying the etching of his plates a little to the extreme; if necessary, radically weakening those of his stronger colours; then the electrotype might develop an ideal print. It is very important that the engraver and the electrotyper shall come to a common understanding on these vital points, working in perfect harmony for an attainment of the one object; plates which shall ultimately produce perfect prints; and both must make concessions to and assist the other.

The success of the electrotyper's reproduction from the half-tone depends primarily upon his treatment of the original in the process of moulding, although the result may be spoiled at any of the subsequent stages by careless manipulation. Unless the mould is perfect in every detail a satisfactory reproduction can never be hoped for. In the first place the original must be scrupulously clean, no ink or dirt remaining between the stipple of the higher lights or in the dots of the shadows. Washing with a stiff bristle brush and any of the ordinary detergents, such as benzine, will generally suffice; although it is sometimes necessary to use more powerful solvents; but these will generally remove the enamel also, rendering any future etching of the plate impossible. It is inadvisable then, to use these powerful solvents, if possible to otherwise clean the plate. A mixture of acetic acid and common salt, diluted with water, will remove ink unless too hard. As a last resort the plate may be heated to about 300° F, and plunged into a boiling solution (saturated) of caustic potash, or soda lye, and well rinsed in running water. In every instance the plate should be dried with soft cotton rags in preference to waste. Do not rub the plate with this rag, but sop up all the moisture possible, finally drying completely with a soft brush, made of goat, badger or camel's hair. After the plate is perfectly dry, and not until then, rub it briskly with another soft brush which has been dipped in polishing lead. I would advise, before putting on the lead; to carefully examine the plate with a magnifying glass, and be sure that it is perfectly clean at the bottom of the etching. Be sure that all the loose lead has been brushed from the plate before it is pressed into the wax. Many electrotypers remove the half-tone from the wooden block before moulding, using one of metal instead. This, I believe is unnecessary, unless a number of impressions are to be taken.

The correct condition of the moulding composition is an important factor in the perfect reproduction of the half-tone, as well as the intelligent handling of the process of moulding. In America most of our best moulders are using the Ozokerite compositions exclusively, and produce very satisfactory results. The addition of 5 % white-pine turpentine and 1 to 2½ % of petroleum to the Ozokerite gives a composition which is very readily worked. It is first, important to have a nicely shaved and even mould; presenting a perfectly faultless, smooth surface. The temperature must be even throughout, which condition can only be established and maintained by placing the cases in a warming cabinet as soon as made; filled and shaved, and keeping them there until used. One of the very worst practices in vogue among moulders is the warming of their cases from the back over the steam table, or worse still, over a metal furnace. The mould becomes very unevenly heated, hard at the surface or face and much softer next to the case. These conditions are not conducive to the best results, giving a shallow, imperfect impression.

The coating of the mould is a vitally important factor to the perfect reproduction of the half tone. It is the secret of success with some and the cause of failure with others. *The thicker this coating is the thicker or heavier the electrotype will* be compared to the original. It is therefore, very necessary to have the coating as thin as possible, and not have the original stick to the wax; or the latter slide away at the edges—"splurging," as the electrotypers term it. Many moulders will give their moulds a liberal coating of moulding lead, and then an equal amount of crocus on top of that. The inevitable result can readily be anticipated. The points of the stipple press through this coating, while it remains intact at the base. In the dots of the shadows the conditions will be even worse than in the more open high-lights, because it will only require a few grains to completely fill the little holes. After the impression has been taken and the mould well brushed before going through the polishing machine, its depth will have been reduced just the amount of the thickness of the coating of moulding

lead and crocus from that of the original half-tone. If the original has been too copiously smeared with blacklead, and especially when moist, the reproduction will be found much shallower than the original. These points may seem insignificant to the general electrotyper, but they are of the gravest importance to the production of perfect work.

The amount of pressure applied and the manner of applying it are also important in moulding half-tones. They should never be forced into the wax like driving stakes into the mud. The pressure should be applied gradually until the desired depth has been attained: then the press allowed to rest for a few seconds until the wax has conformed to the general outline of the original, when enough additional pressure is applied to give the mould its sharpness. It is then allowed to set for a few seconds again and quickly relieved. This method of procedure, governed by good judgment on the part of the moulder, will give the most satisfactory results.

For moulding formes containing half-tones without removing the cuts, the best results are obtained by using the rubber blanket for the first impression, and without using any crocus on the mould. The mould is brushed over very lightly with blacklead: the rubber blanket, very thin gum tissue, laid over the mould and the forme on the blanket. A very light impression is given, enough to get the desired depth. The forme is then removed, the blanket taken off, and after brushing over the mould with the blacklead brush, without adding any lead to the brush; the forme is carefully put back in the same place, and the final impression given to obtain the desired sharpness. The very best results are obtained by following this method, although for cuts alone it is not necessary. Many moulders go over the places on the mould where the cuts are to come, after removing the blanket; with n gas flame, to soften up the wax: but I do not consider that this is necessary. If the mould is at the proper temperature at the start the result will be fully equal.

In polishing the mould extra care is necessary, not to scratch or damage especially the deep shadow portions of the cut. The little dots of the shadows are very slightly raised on the mould, and very little rubbing or heating of a brush will completely flatten them down. The new blast leading machines are best adapted to the polishing of the half-tone mould, and in fact, are the only type which should be used. If hand work is to be done it must be very carefully executed.

The coating of the mould preparatory to its immersion in the depositing tub, is an operation requiring the greatest delicacy of touch to avoid scratching the surface. If the iron is brushed over the face of the mould too violently some of the sharp particles will be rubbed into the wax and the result spoiled. For this operation it is better to use a smaller brush; of long, fine hair—badger or goat—and to use it simply to agitate the solution to hasten its action on the iron filings, and make the coating even; which would otherwise coat in spots unequally. Never allow the copper to form in little lumps on the bristles of this brush, as they will surely scratch the face of the finer cuts.

With the mould in the depositing tub the greater part of the critical work is done, and if faithfully performed the reproduction should be practically perfect. Careful vigilance should not be relaxed at this stage however, but maintained up to the delivery of the cut to the printer. A shell rather heavier than the ordinary should be deposited on the mould, and the utmost care exercised in its removal from the wax not to strain or twist it in any manner. Always have the water above boiling point before using. To remove every trace of wax from the face before backing up, the shell must be thoroughly washed with a boiling solution of concentrated soda-potash, caustic lye, rinsed in hot water, put through a sulphuric acid pickle, and again rinsed in cold water before being flowed with the soldering fluid.

The texture of the deposited copper is an important factor to the perfect backing up of the shell. The copper should be soft and tough, and with proper treatment may be backed up without any shrinkage. After the solderfoil is melted the metal must be carefully poured from one side, and allowed to flow over the shell until it is completely covered before the backing pan is removed from the kettle. After the pan is swung out to the stand enough more metal is added to bring the cast to the desired thickness. Never pour the metal violently or directly on to the face of the cuts, always gently and from the side. In cleaning the cast after cooling never use any gritty substance. It is better to brush the cast over with lye, then brush well with kerosene, rinsing with hot lye, and finally with hot water, drying in pine sawdust or with cotton waste.

The less finishing the electrotype receives the better will be the result. If it is possible, confine the work to the simple straightening of the general surface of the cut without any beating. With cuts having vignetted edges the electrotyper may materially assist the printer by making the general surface, face, of the cut slightly convex, where the edges will be slightly lower than the middle portions of the plate.

The writer has in its embryo state, though nearly perfected, a process for moulding half-tones in a material which is in itself conductive; needing no blacklead either in moulding or for polishing, and from one mould as many deposits may be made as desired, the last fully equal to the first, and all perfect reproductions of the original. This method will be invaluable for the production of nickel deposits, impossible in ordinary wax.

Block by
Vaus & Crampton, Ltd

Photo by
H. Trault

THE SMITHY

Importance of Accurate Type-High Blocks.

By Paul Shniedewend, Chicago.

THE LOOKER

A FLASH LIGHT STUDY THROUGH A MIRROR

Block by GROSVENOR ENGRAVING Co

Photo by W. ROBERTSON

To dress mounted half tones or other plates to an exact type high point would seem simple enough were we not aware of the constant annoyance and waste of time caused by this one little bugbear in both foundry and press room — in the one to produce the desired uniformity of height by best methods, and in the other to properly print from the ill dressed block so often met with. Of course, if blocks are not type high or level they must be made so before a perfect impression can be produced. However skilful pressmen may be in juggling blocks by their own peculiar methods, they are eager to dispense with this part of their labours, and so are their employers, who have a hankering for expedition.

The most essential point is to have the cut mountings level, much more so than that, though level, they are less than type-high, in which latter case underlaying can be made effective over all at once; but in the case of unlevel blocks, producing a mottled impression or allowing plates to spring or wobble, there is but one good remedy — a new mounting; even then enough damage to delicate plates may have been done to make the remedy but partial. The screened half tone background will have a mottled appearance on the slightest provocation, and cause an unending amount of "finicky" labour. Nowhere is a defect more conspicuous than in these backgrounds, where slightest broadening of one tiny dot makes an unsightly spot, and unlevel blocks with resulting unevenness of impression may so injure a plate as to make the blotches permanent. Admitting that the pressman's skill will finally prevail, such a cut and block will have to undergo identical elaborate make-ready at each subsequent using. Engravers who obtain their own proofs by using tested steel bases and afterwards mount plates upon wood, often do not appreciate that it is the wood blocks which have made the pressman's work inferior. There should be some means of knowing that the wood blocks also are accurate. If surrounded by accurate type-high bearers and tested on a hand press specially built for half-tone (such as now used by many engravers and printers) the evenness and reliability of which are known quantities, any defect in block is easily detected.

A cogent reason of injury or undue wear to plates comes from having them above type high. All improvement in the different appliances used in printing involves a certain reliance on the perfection of each other. Thus improvement in presses is toward type-high rigidity, and no provision is made for yielding to over-high plates; so the better the press, the greater the chance for damage, the only safety lying in whatever give the packing affords, which, too, is becoming harder and harder in order to promote rigidity. Only one impression, often, is enough to put the plate beyond redemption. The impression on a hand press can be stopped at any point, but not so on power presses.

Proper dressing of blocks depends much upon the means employed. All other methods having been tried and found wanting in one respect or another, the rotary planer stands as the most approved. A rotary planer, or "type high" machine, designed especially for this purpose, presents many advantages both of facility and perfection of results. Owing to the speed and nature of the cutting, the latter is not affected by the size of block nor the direction or varying toughness of grain, gouging and splintering being obviated. All know how accurately metal furniture can be trimmed with the vertical trimmer; the type-high machines, with greater strength of construction, give equal accuracy in a horizontal cut. It is possible, too, to give the final dressing to open cuts after they are mounted, as clamps on the planer bed hold them securely and prevent tilting or crushing. Speed, automatic features and compactness, are other reasons for preference.

In the last YEAR BOOK we mentioned untrue wood blocks as one cause of discrepancy between engravers' and printers' proofs of half-tones. We had then and since occasion to experiment with different blocks and different methods of dressing in testing special half tone hand presses, which led to the construction of a type-high machine such as referred to above for type-high dressing exclusively.

It is safe to assume that type-high accuracy of electrotypes will be the rule only through the adoption of a positive and economical mode of dressing.

TEMPEST SCARRED

Block by
GROSVENOR ENGRAVING CO.,
Bristol

Photo by
AGNES B. WARBURG

The Half-Tone Process for Machinery Catalogues.

By Wm. A. Hinners (the Binner Engraving Co., Chicago).

Block by SALVATION ARMY. *Drawing by* THOS KENT.

To review the progress of engraving in its different branches during the last decade would be an inexhaustible subject, while to elaborate on the subject of illustrating for machine and engine catalogues is quite unnecessary, for all those interested in the subject of engraving and directly connected with the art and business of making printing plates have seen the half-tone process develop unto a degree of almost perfection.

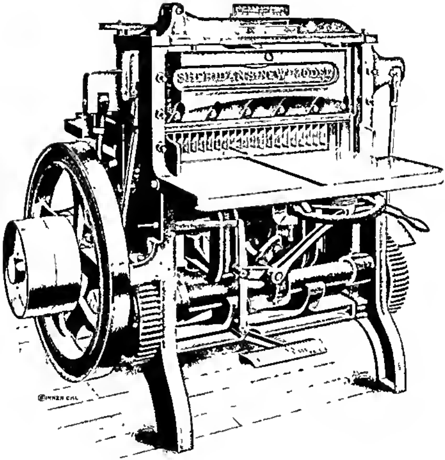
Catalogues of ten years ago were illustrated by wood cuts, which, although most accurate in outline, yet lacked that photographic appearance necessary to display articles of merchandise in such a manner as to make them appear as truthful representations and illustrations. Inasmuch as the trade in manufactured articles has been constantly increased and, unquestionably, to a great extent, through the use of printers' ink, the necessity for truthful illustrations has become manifest and has been fulfilled and exemplified in the half-tone of to-day.

The fine results, as shown in the example herewith, are not entirely due, however, to the half-tone engraving alone, but to the intelligent retouching of the photograph before engraving. A few years ago commercial artists were not able to retouch a photograph properly; they were not sufficiently familiar with the correct colours to apply, nor had they the knowledge of mechanical construction and general principles of steam and electrical appliances; in other words, they were not mechanical draughtsmen.

Education, however, has been going on along this line, and all the demands on the commercial artist have been met by those who have made this particular line of work their study. Then, too, during the last few years the air brush has been used to a great extent, by the use of which the soft, smooth surfaces could be produced.

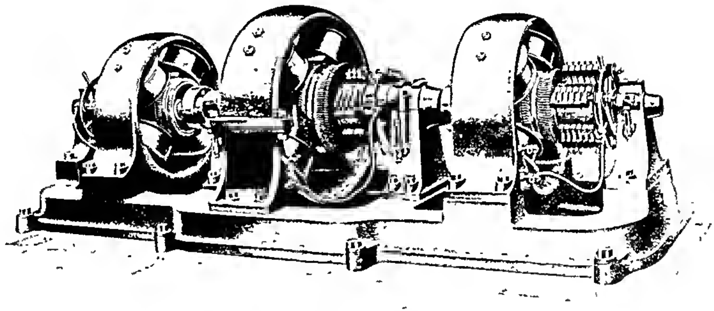
Photographing of machinery is difficult on account of imperfect lighting and the presence of shop *débris*, for machines and engines are usually set up in a machine shop without these necessary advantages, and, owing to the presence of oil spots and other markings, defects in the photographs exist which would appear in the half-tone plates, except for the retouching and redrawing over the photograph.

An engine builder who illustrates his catalogues and depends very largely upon them to sell his goods, should provide a suitable place for photographing, where machines could be set up, cleaned and painted for that purpose. In all cases, however, although a photograph may be very imperfect in detail, appearance and colour, the art of the artist and the process of half-tone engraving, in the perfect state of to-day, can produce an illustration of a machine or engine truthful in representation, detail and construction and most flattering in appearance. Such an illustration will "talk" as would a salesman.



Catalogue Illustration

By the
Binner Engraving Co., Chicago.



Half Tone by Tillotson & Son, Ltd.

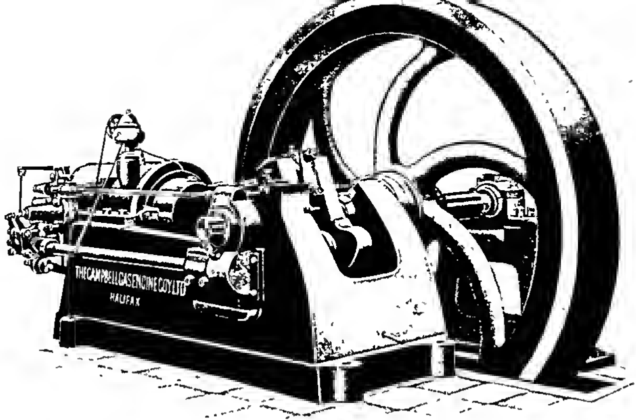
(Reprinted by kind permission of Messrs. The General Electric Co (1900), Ltd, Manchester.)

Half Tone by Tillotson & Son, Ltd

(Reprinted by kind permission of Messrs. Spiers & Pond, Ltd., London.)

FASHIONS OF THE DAY.

Block by
DEBENHAM & FREEBODY

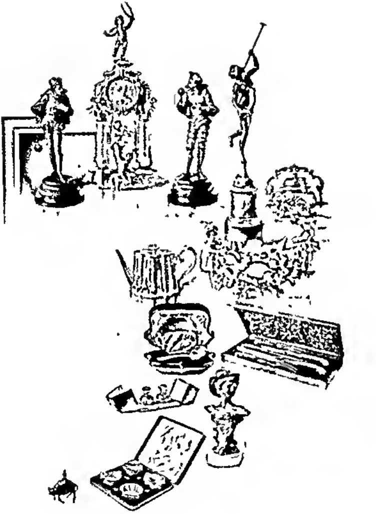


EXAMPLE OF CATALOGUE ILLUSTRATION

Block by
Wilson & Hudson, Manchester.

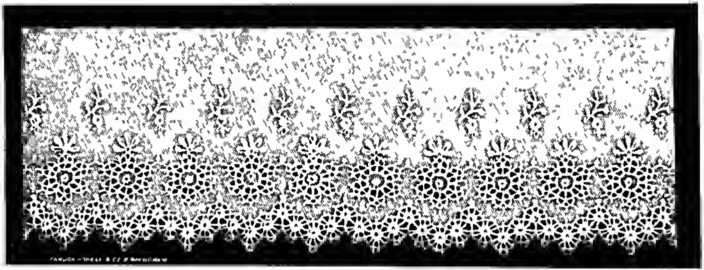
PLASTIC DESIGN
Suitable for Catalogue Covers, Show Cards, etc

Modelled and Engraved by
THE ARTHUR COX ILLUSTRATING CO., LTD.,
Birmingham.



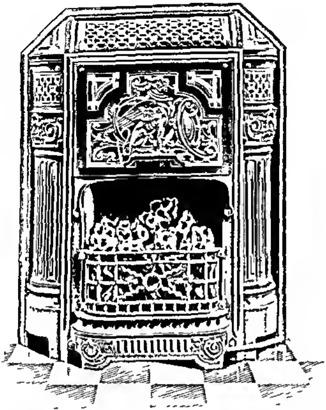
Half-Tone Engraving by
W A WORRALL & Co, Watford, Herts

Photographed from
the Objects.

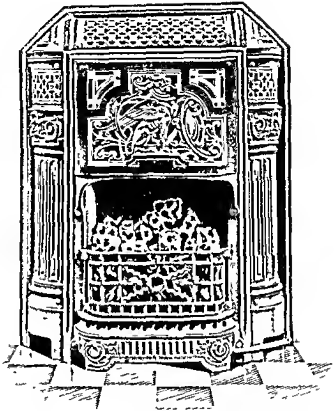


Line Zinco Block by
FARDON, HOWELL & Co., BIRMINGHAM

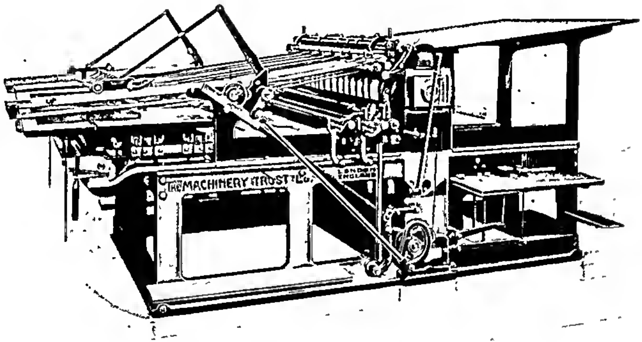
Photographed
Direct from the Lace



Half Tone on Copper by
JOHN SWAIN & SON, LTD.,
58, Farringdon Street, E.C.

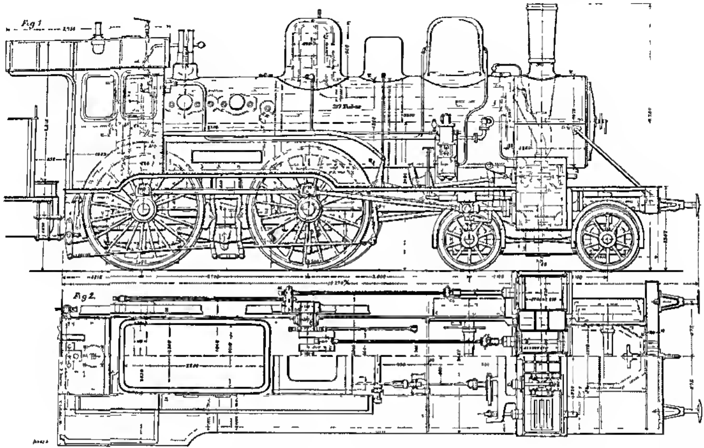


Electro by
BADOUREAU & JONES
Fine Art Electrotypers,
Poppin's Court, Fleet Street, E.C.



Half Tone Copper Etching by
THE ARC ENGRAVING CO., LTD

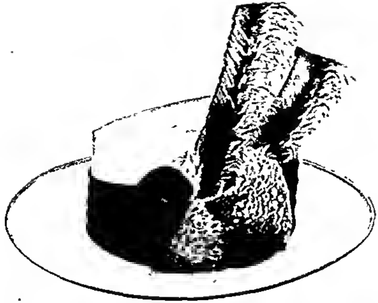
Specimen of
Catalogue Illustration



EXAMPLE OF MECHANICAL DRAWING

Line Zinc Etching by
TAILBY & PRICE.

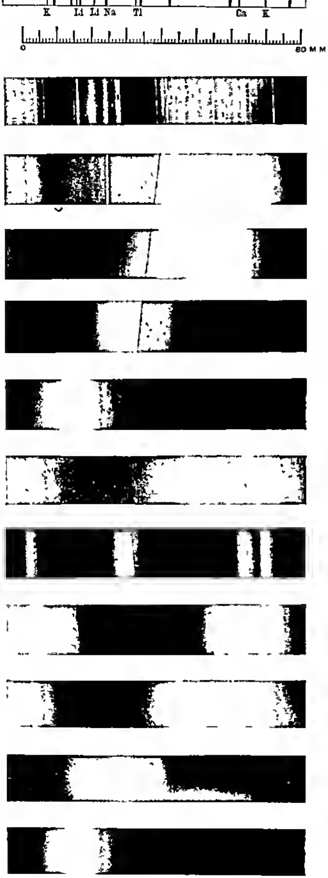
By kind permission of the
Proprietors of *Engineering*



COMMERCIAL APPLICATION OF THREE COLOUR PROCESS.

Example of Three Colour Process
By JOHN SWAIN & SON, LTD.,
58, Farringdon Street, E.C.
Studios, High Barnet

Three colour negatives produced
direct from the object.



I. Spectrum of Arc Light with various salts, showing Fraunhöfer Lines

II. Spectrum showing position of Sodium D Line

III Spectrum through a *Blue Violet* Filter

IV Spectrum through a *Green* Filter

V Spectrum through a *Red* Filter

(III–V) Example of Light Filters which are correct when used with plates sensitive to *all* rays of the spectrum

VI. Spectrum through a *Blue-Violet* Filter

VII Spectrum through a *Green* Filter

VIII Spectrum through a *Red* Filter

(VI–VIII) Example of Light Filters which must be used with plates sensitive to *certain* rays of the spectrum, and therefore showing incorrect bands of absorption if used with plates sensitive to all rays, as in this case

IX Spectrum through a *Blue* Filter

X Spectrum through a *Yellow* Filter

XI Spectrum through a *Red* Filter

(IX–XI) Filters for Collodion Emulsion sensitized for certain rays of the spectrum The bands of absorption are to cooperate with the insensitiveness of the plate for certain spectrum rays

TALLENT'S DIFFRACTION SPECTROSCOPIC CAMERA

Examples of Test Exposures

spectrum can be seen on the glass, or the image may be examined by means of a magnifier, focussed on the front surface of a piece of plain glass inserted in the slide.

The possibility of seeing the whole spectrum at one time enables one to guess at the proportionate reduction of colours when examining colour-filters, etc.

The dark slide, when moved in its grooves, brings successive portions of the plate opposite the spectrum band, and successive exposures can be made on the same plate. The number of these exposures depends on the width of the mask at the plate end of the camera.

The Masks.—The length of the adjustable slit determines the width of spectrum, and according to the number of the spectra required on a plate so is the width of the spectrum made greater or smaller. It is inadvisable to have wide spectra as the amount of scattered light is increased, and it is convenient to take from four to six spectra on one plate. The latter number has been decided upon for the instrument, and the aperture made in accordance. The length of the adjustable slit is shortened to give a spectrum just wide enough to fill the aperture at plate end of camera.

The Operations.—The operations of taking spectrum negatives in the apparatus are very simple. A source of light is placed at a few inches from the slit end, and the image examined on the ground glass to see that it is illuminated correctly. The dark slide is removed, the sensitive plate transferred to it, and the exposure made, a colour-filter, etc., being placed just outside the slit. Successive exposures can be given if desired, or a strip of dry plate suitable for one exposure used. (If used in dark-room there is no necessity to remove slide).

To use the instrument to the best advantage several points should be attended to.

The Illumination.—To secure the full breadth of band of colour it is necessary that the flame used to illuminate should subtend a sufficiently large angle at the slit.

Fig 2

This would be secured by a broad gas flame at a few inches from the slit, by exposing to the sky, or to an evenly illuminated sheet of white paper (illuminated by electric arc light).

If it is desired to employ arc light it would be necessary to place it so close to the instrument that it would damage the apparatus. To avoid this and still secure the necessary angle of illuminant a lens can be employed.

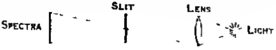


Fig. 3

This secures the further advantage that no more than the necessary angle of light need be used (consequently there is less scattered light).

A further advantage accruing from the use of the lens is that any portion of the illuminant can be used to the exclusion of others. Thus, either the incandescent points or the arc—the glowing vapour in the space between the points—may be focussed on the slit.

To conveniently employ this lens method a small fixing should he employed, consisting of a wooden base and a wooden upright holding the lens.

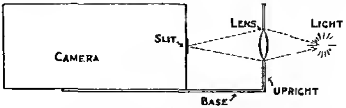


FIG. 4

The camera is placed on the base, and the lens is then at the right height to illuminate the slit.

The object in illuminating is not only to secure the full width of spectrum, but also to avoid using a beam too wide, part of which would fall upon the diaphragm at the rear end of the camera. All this extra width of illuminating cone falls on the interior of the camera, and, in spite of the blackening of the surfaces, is scattered in the direction of the plate. In the case when the camera is exposed to an expanse of sky, a great deal of this useless light falls upon the interior. It can be avoided by using the lens extension in front of the slit, covered in at the sides and top.

A most convenient source of illumination, and one that affords the necessary width of flame surface at a suitable distance, is an incandescent gas burner fitted with Welsbach mantle. These burners give a hright light of a nearly white colour, and in the majority of experiments, which are of a comparative nature, no drawback occurs in their use. For most of the experiments detailed in the list on page 56, the incandescent gas-light is more suitable than any other, but an occasional use of the electric light is desirable (e.g., testing filters for transmission of ultra violet).

Without the prism-grating the image of the slit is thrown in a straight line through the axis of the lenses on to C (fig. 1).

By interposing the prism images of the slit in various colours are thrown upon C, and the spectrum obtained is actually a continuous coloured hand due to the coalescence of the innumerable coloured images of the slit.

All parts of the apparatus, except one jaw of the slit and the dark slide, are rigidly fixed. This prevents portions of the apparatus getting out of place, and ensures that the apparatus is always ready for use without previous adjustment.

Focussing.—The instrument is adjusted in correct focus, and by using good achromatic lenses the general focus for all the visible rays is brought to one vertical plane. To test the focus without removing the prism a sodium flame can be used.

The Prism-Grating.—To secure dispersion—that is, the separation of the colours—a prism grating is used. Use is made of the celluloid casts of diffraction gratings recently introduced by Mr. Thorp. These gratings are replicas in clear celluloid of Rowland gratings of good quality, and of a suitable number of lines to the inch. By the use of these casts a comparatively inexpensive and very perfect diffraction grating is secured.

A diffraction grating has been chosen for this apparatus in preference to a train of prisms, on account of the very much increased dispersion (length of spectrum obtainable). To secure the same amount of dispersion would necessitate a compound train of prisms, employing yellow glass, and introducing many more reflecting surfaces. The cost, also, of such a prism train prevents the production of a cheap instrument.

Were the grating mounted on a plane parallel glass the spectrum would be thrown aside from the axis of the lenses, and the rectangular shape of the camera box could no longer be maintained. To avoid this Mr. Thorp mounts the gratings on a prism of such refracting power that the spectrum is brought back to the axial line, and can be focussed in a plane at right angles to the axis of the lenses. The instrument, therefore, possesses the advaotage of "direct vision."

In diagram fig. 1, F shows the prism with the grating mounted upon its hypotenuse, or longest side.

The gratings supplied with these instruments have been copied from a very perfect and valuable Rutherford grating in the possession of Sir W. Abney. The spectrum of the first order which is employed is particularly bright.

The Slit.—The slit has both jaws carefully worked. One is fixed and the other movable, the latter controllable by a screw. This screw has a radial line marked upon it for the purpose of setting the width of slit. The slit is closed by the screw, and opened by a spring, which takes up the backlash of the screw The jaws of the slit should always be set in the same manner, *i.e.*, the final motion should always be made by turning the screw either right-handed or left handed A slit width of from $\frac{1}{50}$ to $\frac{1}{500}$ inch is most generally useful.

The Lenses.—The lenses may be removed for cleaning, after which they should be returned to their seatings facing the right way, plane side away from the prism (fig. 1) and the shorter focus lens nearest the slit.

The Prism itself may be removed for dusting.

The Masks.—There are three masks in the instrument—one on the slit, one on the prism, and the third at the plate end.

The mask at the prism is to prevent any light passing through the prism without going through the grating. Should this be removed a narrow band of white light will fall on the middle of spectrum.

Collimator.—The front portion of the instrument from the slit to first lens is called the collimator, and from the second lens to plate is called the camera. The wooden separation-piece holding lenses and prism prevents light in one section reaching the other.

Camera.—On the bottom of the camera is found a piece of blackened wood. The object of this is to prevent the deflected *white* beam from reaching the sensitive plate. It is received between the screen and the base as in a pocket, and the surface of the wood being blacked very little scattered light emerges.

Dusting.—The lid of the camera is hinged, and the interior of the camera can be got at for dusting, which should be done with a brush, and not with a cloth, avoiding damaging the blackened surface.

The efficiency of the camera, like that of other cameras, depends on the freedom of reflections from the inside of the camera.

Width of Slit.—The spectrum band is caused by the coalescence of the infinite number of the coloured images of the slit. The width of these coloured images will be dependent on the width of the slit. Too wide a slit will cause too much merging of the coloured images, and according to the work in hand so must the slit width be altered.

When photographing the spectrum of daylight, if the slit is too wide the colour images coalesce, and the narrow lines of missing colour (Frauenhofer lines) are lost. The slit, therefore, when photographing these lines must be closed *almost* entirely. When almost closed dust between the jaws of the slit causes lines along the length of the spectrum. This dust can be removed by opening the slit and inserting a stick of wood (elder wood by choice) and rubbing the jaws with it.

Were the grating mounted on a plane parallel glass the spectrum would be thrown aside from the axis of the lenses, and the rectangular shape of the camera box could no longer be maintained. To avoid this Mr. Thorp mounts the gratings on a prism of such refracting power that the spectrum is brought back to the axial line, and can be focussed in a plane at right angles to the axis of the lenses. The instrument, therefore, possesses the advantage of "direct vision."

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The Lenses.—The lenses may be removed for cleaning, after which they should be returned to their seatings facing the right way, plane side away from the prism (fig. 1) and the shorter focus lens nearest the slit.

The Prism itself may be removed for dusting.

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A narrow slit must also be employed when using electric arc light, if it is desired to show the lines.

A medium width of slit is sufficient for eye observations only. This may be from $\frac{1}{100}$ to $\frac{3}{100}$th inch wide. This width of slit is also suitable when photographing patches (three-colour or orthochromatic processes). A narrower slit should be employed if the source of light is close to the slit.

Shutter.—A suitable shutter can be made by placing in front of the slit a plate of metal or cardboard.

Dark Slide.—Before exposing, the piece of ground glass should be placed in the slide and the image examined to see if the light is central. The successive exposures are made by moving the dark slide across the aperture according to the marks shown on the framework. The slide should be moved from left to right, then when printed the successive exposures will be from left to right if the red is placed at the top end of picture.

Overlapping Spectra.—A diffraction grating gives on either side of the undispersed image of the slit several spectra of diminishing brightness, and it will be found that the extreme red of the spectrum is contaminated by traces of the violet of the spectrum of the next order. (See Plate I.) This is only noticeable when employing arc light, where the extreme violet rays are exceedingly bright. In general, it does no harm, its effects being easily attributed to the true cause. In very careful work portions of the spectrum very much brighter than others, and thus likely to give misleading results, must be reduced in value or entirely absorbed by colour-filters.

If an excessive exposure be given the whole of the plate beneath the rectangular opening will be equally covered with deposit, and thus the effect of the spectrum quite obliterated. The remedy for this is to give such short exposures that only the spectrum is registered upon the plate. When the spectrum band is narrower than the rectangular opening the effect of this fog is easily seen, and allowance can be made for it.

Ultra-Violet.—It will be noticed that in comparison with spectra given by prisms the disposition of the colour is altered. The red end is more spread out and the blue end shortened. According to the dispersion apparatus used, whether prisms, diffraction gratings or prism-gratings, so will the "cramping" of colours alter.

Plate I. gives the result of a long exposure to electric light; notice that the violet end of the spectrum always ends at a certain point. Glass, used in the lenses and prism (and condenser), and also in photographic lenses, stops the invisible ultra-violet beyond that point shown in the negative. The small amount of glass used and its freedom from colour prevents the absorption of the visible and invisible violet so noticeable where prism trains are employed. There is, then, no necessity, for photographic purposes, to employ quartz and spar (materials transparent to ultra-violet). The remaining ultra-violet passed by glass can be photographed, and dealt with as desired, by filters, etc.

For those who have not the electric light, magnesium ribbon will be found very useful for the examination of presence of ultra-violet.

Scaling.—It is necessary to know, when a negative has been taken, to what colours the deposit on the negative is due. The plate after development may be returned to the dark slide and the deposit on the negative identified with the colours, or a scale may be made from the spectrum, and this may be applied to the negative. Such a scale on glass, with the position of the bands of colour and the Frauenhöfer lines marked on it, can be easily made. The position of some of the Frauenhöfer lines can easily be found.

the opacity of the patches, it is possible to gain a good idea of the relative action of the colours on a sensitive plate, by the artifice of making a *series of exposures* to the spectrum, increasing the exposure in each negative. According to the circumstances the successive exposures may be multiplied by two, three, four or five. The least exposure should be only just sufficient to show deposit in some sensitive portion of the plate.

An extremely long exposure will probably show signs of fog around the spectrum. Provided the shorter exposures have been made, there should be no difficulty in deciding whether this fog deposit is to be regarded or not.

The use of the lens attachment largely assists in keeping down the fog, and in the case of the employment of electric light should always be used.

Example: Take as example an ordinary plate exposed to the spectrum of daylight. A short exposure gives action only in the blue, longer exposure causes the action to spread on both sides of the blue. Further increased exposures give very little increase in the length of spectrum obtainable, but the blue becomes over-exposed. The useful limit is soon reached, and further rendering of green and red must be brought about by longer exposures while employing colour filters to shield the blue.

Three or four successive exposures of doubled duration will show the distribution of sensitiveness. Great attention must be paid to the amount of development of the plate.

A patch of density may be developed for a short or a long time. It is useful to develop for a long time when the *form* of the patch of density is required to be known. Thus, a patch may be densest in the centre, the density fading to the edges. A very short development will show almost even density all along the patch, whereas longer development will cause the most exposed portions to become densest, demonstrating the "mountainous" form.* Too long development will produce excessive density in parts, which can neither be printed nor visually estimated. A shorter development, then, will be more suitable. The time of development will depend on the kind of negative the operator desires, and which will suit the printing process.

To avoid error in the interpretation of the developed negative it is advisable to print the negatives exposed in some familiar printing process, and also it will ensure that a reasonable amount of development is given if a strip of a landscape or portrait negative on the same plates is developed in the same dish for the same time to printing density.

Attention must always be paid to the *useful limits*. The actual developer has little or no influence, but preference may be given to one of the non-staining class, as it is often convenient to use the developer several times. P.O.P. or Eastman's Nikko or similar papers are useful for making the prints on.

Photometric Examination.—A photometric examination of the deposit on the negative can be readily made, provided one has the necessary apparatus.

The operations are (1st) to take a spectrum on the plate, and (2nd) to expose the same plate to known intensities of light, developing both simultaneously, and (3rd) to compare, in suitable apparatus, the unknown opacities of the spectrum band with the known opacities of the tints. Thus we obtain the exposures of the spectrum band.

A photometer can be used to measure the opacities in both cases, but the most suitable apparatus is the opacity meter, designed by Mr. Chapman Jones for such work (see *R.P.S. Journal*). A series of tints can be exposed on the plate by a Spurge sensitometer, or a modification of it.

* This would be further complicated when using dyes in solution of different strength. Thus, a more concentrated solution of dye would give a patch of density similar in shape to that given by a weaker solution with longer development.

easiest to find is the sodium or D line. To produce this, a flame, surrounded with a ring of twisted wire, holding pieces of asbestos fibre dipped in a solution of common salt or washing soda is all that is required. The Welsbach incandescent burner used for other experiments is also useful for this purpose. The mantle and rod are removed, and the end of the twisted wire is placed in the rod-hole. (See fig. 5.) By this means a copious yellow flame is secured, and a negative as in

Fig. 5

Plate II. can easily be obtained. The blue flame, always associated with the sodium flame, can be masked by employing a yellow filter. Other salts can be used to provide other lines. The following table gives the most useful salts for use in the bunsen burner. It will be found easiest to find the positions by eye observations.

Deep red	Potassium Salts	in bunsen.
Red	Lithium Salts	,,
Orange	,, ,,	,,
D line	Sodium Salts	,,
Thallium (green)	Metallic Thallium	,,
"Little B"	Metallic Magnesium	,,
Strontium (blue)	Strontium Salts	,,
Calcium (blue)	Calcium Salts	,,
Potassium (violet)	Potassium Salts	,,

A hydrogen tube worked from an induction coil is also very useful for scaling. This may be placed close to the slit.

For a fuller account see page 134, "A Handbook of Photography in Colours."

All these positions can be scratched on a piece of glass placed in the slide, and this may be placed in contact with the developed plate.

In practice it is convenient to photograph the D line as given by the bunsen burner on the same plate as the other photographs are taken, then if the scale plate is applied to it so that the D lines register, the positions of the patches of density can be read off against the scale plate.

Exposure and Development of Spectrum Negatives.—To avoid falling into error in the interpretation of the results of experiments it is necessary to pay particular attention to the exposure and development of the plates. Beginners in spectrum work do not differentiate between the effects of exposure and of development.

The amount of exposure and development should be kept within *useful* limits. Thus, in the case of making an orthochromatic negative of the spectrum on a plate of little red sensitiveness it may be possible to get action on the negative by the red rays by sufficiently increased exposure, but such exposure might be excessive for the other portions, and they would be much over-exposed.

Successive Exposures.—Without resorting to actual measurement of

the opacity of the patches, it is possible to gain a good idea of the relative action of the colours on a sensitive plate, by the artifice of making a *series of exposures* to the spectrum, increasing the exposure in each negative. According to the circumstances the successive exposures may be multiplied by two, three, four or five. The least exposure should be only just sufficient to show deposit in some sensitive portion of the plate.

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USES OF THE SPECTROSCOPE CAMERA.

A. The Study of Colour and the Spectrum (Visual).
B. Examination of the Colour-ray Composition of Lights (Visual and Photographic).
C. Examination of Transmission of Coloured Media (Visual and Photographic).
D. Examination of Distribution of Sensitiveness of Plates (Photographic).
E. Application of C and D to Orthochromatics and Three-colour.
F. Application to Developing-room Filters.

TYPES OF WORK POSSIBLE WITH THE SPECTROSCOPIC CAMERA.

Scaling.

I. Arc light, using orthochromatic plate, without filter.
II. " " " " with filter, with mixtures of salts and lens attachment.
III. Sodium flame (bunsen or Welsbach burner).
IV. Salts in magnesium ribbon (lithium, strontium, calcium, etc.).
V. Daylight.

B. Examination of Colour-ray Composition of Lights (Method of Successive Exposures).

VI. Incandescent solid (*e.g.*, electric arc, use lens).
VII. Incandescent gas " " " without salts.
VIII. Arc with single salts (with lens) for spectrum analysis.
IX. Hydrogen tube (also used for scaling).
X. Incandescent gas-light and other illuminants (acetylene, magnesium, etc.).
XI. Daylight.

D. Examination of Distribution of Colour Sensitiveness of Plates (Method of Successive Exposures).

XII. Ordinary plates. } Exposed without filters.
XIII. Orthochromatic plates. }

C. Examination of Transmission of Coloured Media.

(*a*) Influence on shifting maximum of sensitiveness.

XIV. Ordinary plate.
XV. Orthochromatic plate.
α The position of maximum sensitiveness (colour).
β The ultimate limit of sensitiveness (colour).

(*b*) The examination of coloured media.

XVI. Dyes—glasses, etc.—Examination of

E. Application to Orthochromatics (Preliminary Investigations).*

XVII. On ordinary plates.
XVIII. On orthochromatic plates.

E. Application to Three-colour Work (Preliminary Investigations).*

XIX. On orthochromatic and ordinary plates employing suitable filters. (See Plates III to XI.)

F. Application to Dark-room Filters.

(*a*) For ordinary plates.

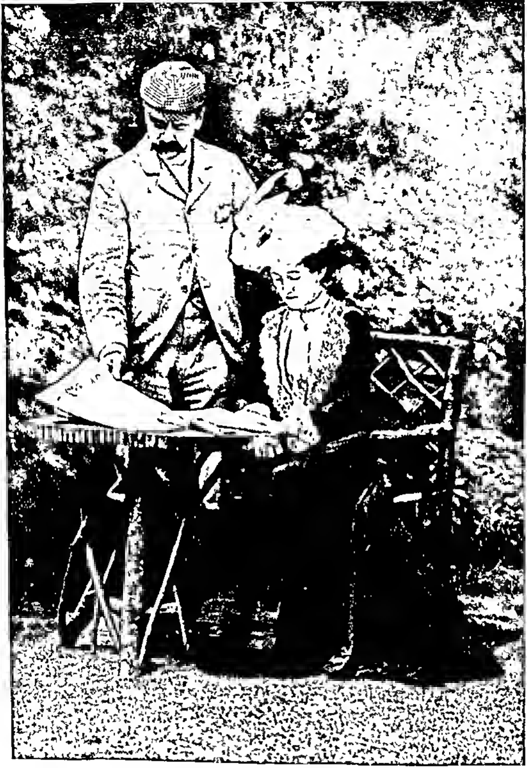
XX. Examination for ultra-violet and dark violet.†
XXI. Examination for visual rays.

(*b*) For orthochromatic plates.

XXII. Examination for ultra-violet and dark violet.†
XXIII. Examination for visual rays.

* To be followed by some quantitative method of examination

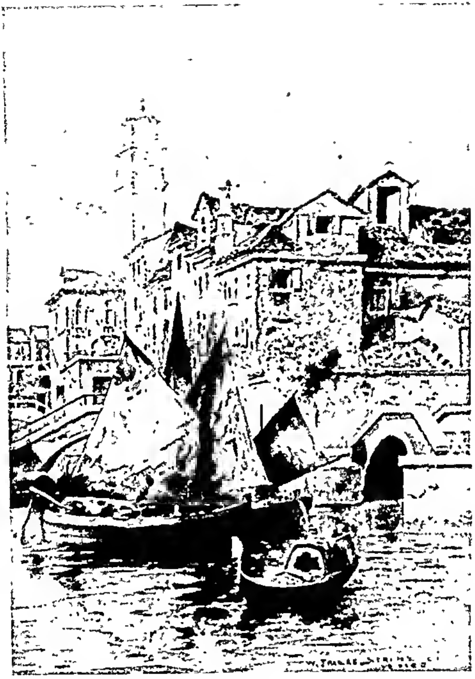
† This should be done by electric arc light—a strong light rich in ultra-violet rays



PORTRAITURE IN THREE COLOURS.

Example of Three Colour Process
By JOHN SWAIN & SON, LTD.,

Three colour negatives taken



A SCENE IN VENICE

Three-Colour Blocks by
The Electric City Engraving Co.,
Buffalo, N.Y.

From a Water-Colour Drawing

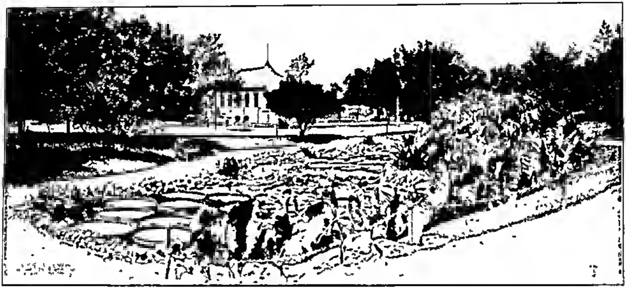
A BRITISH-AMERICAN

Miss Marjorie Doris Grantley-Glasgow

Half Tone by
ELECTRIC CITY ENGRAVING CO.

A LOVE LETTER.

Half-Tone by
Electric City Engraving Co.,
Buffalo, N.Y.



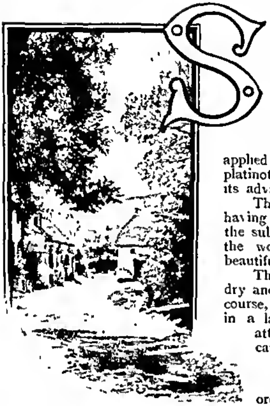
THE LILY BEDS IN LINCOLN PARK, CHICAGO

Half-Tone by
Barnes Crosby Co., Chicago

Photo by
Mellen

Collotype as a Hobby for Amateurs.

By Geo. Holzhausen.



West Luccomb, Somerset

Block by C. W. Harness — Photo by Godfrey Bingley

SINCE the camera has become so universally popular as a hobby, and is within reach of the most limited income, it is quite possible for an amateur to go farther, and, by closely following the directions in this article, produce his prints by means of the collotype process with the greatest ease and rapidity. As the process is a permanent one, and may be applied with equal success to the imitation of platinotype, bromide, silver-print or photogravure, its advantages will be readily acknowledged.

The initial outlay is not a heavy one; and, having obtained the necessary plant for the work, the subsequent cost is small, while the results, if the work is successfully carried out, are most beautiful.

The most important feature in collotype is a dry and perfectly even temperature, which is, of course, more easily found in a private house than in a large factory. If this point is carefully attended to, and the following instructions carried out, failure should be impossible.

Coating the Plates.

Only patent plates should be used, as ordinary ones would break when subjected to the heavy pressure required in the printing frames. The most convenient size for beginners to use is 10×8 or $12 \times 10 \times \frac{3}{8}$in. thick, to give plenty of margin round the picture, as this will prevent damaging the inking rollers. As polished plates are so easily scratched, grind with the finest emery powder as follows:—Sprinkle the powder all over the plate, damp it by sprinkling a few drops of water on it, lay another plate on top of it, face down, and grind in small circles until the plate has a fine matt surface, free from scratches. At the same time take the edge off the plate with an old file.

Plates that have been previously used must have the old coating of gelatine cleaned off before using again, and this is done as follows:—Immerse them in a strong solution of potash lye, then scrape the plate with a knife or scraper, scrub well with a brush and regrind. When dry the plates are ready for the first preparation, made up as follows—

Silicate of potash	1 ounce
Beer	10 ounces

To be mixed together and filtered through a cloth. Before coating level and dust the plate. Pour plenty of solution in the middle, spread all over with a piece of paper, lift the plate quickly and drain off from one corner through a cloth

into a jug, after which place in a rack to dry. When properly dry wash the plate for a minute under a tap to get rid of the free silicate and dry again. Plates, when coated with this preparation—which is only to make the gelatine adhere to the glass—will keep for any length of time.

The plate must now be placed in a properly made drying-box. If anyone can afford to pay for a good one this may be obtained from Messrs. Penrose & Co., who can also supply everything connected with the collotype process. But anyone with a capacity for handling tools may make his own box in the following way.—A well-made box, constructed so that the temperature is equal all over, and fitted with the necessary levelling bars and screws, will answer the purpose. The size depends on the number of plates to be prepared at one time. The box should rest on supports about 18 in. high, and must not be less than 18 in. deep, as the ledges, to take the levelling bars, must be 9 in from the bottom of the box. The bottom should be made of galvanized iron, with a layer of gravel spread over it. Four inches underneath this the gas jets or paraffin stove should be put. The box, if possible, should be lined with zinc or galvanized iron to keep in the heat. The top is a hinged frame with canvas stretched over it, so that the vapour can escape when the gelatine is drying. A small hole should be made in the canvas for the thermometer.

Preparing and Drying the Plates.

Place the washed plates in the drying-box, level them by means of the levelling screws, and heat up to about 120° Fahr. While this is taking place prepare the sensitive gelatine on the following lines:—

SOLUTION No. 1

Gelatine	2 ounces
Water	23 "

Soak the gelatine for half an hour or so in the cold water first; then place the vessel in a water bath, and gradually raise the temperature till the gelatine is melted.

SOLUTION No. 2

Bichromate of potash	2 drachms
Bichromate of ammonia	2 "
Water	2 ounces

Put the bichromate of potash and ammonia into the specified amount of water, and place in a jar in a saucepan of water, raising the temperature not higher than 120°, and stirring till dissolved. When the gelatine in No. 1 is thoroughly melted, add the No. 2 Solution to it, and filter through good filter paper.

It is most important to have the same proportion of sensitive gelatine on each plate, or mistakes in exposing the plates will surely be made, as a thin coating would take a much shorter time to expose than a thick one. Each plate should have four minims to the square inch; therefore, to find out how much to put on a plate, find the number of square inches and multiply by four. For instance, a 12×10 plate equals 120 square inches; this multiplied by four gives 480 minims = 1 oz.

The preparing-room must be kept warm, or the gelatine will set on the plate when coating. Now take the plate from the drying-box, place it on a levelling stand, level, dust it, measure out the gelatine and pour it on the left-hand side of the plate. Raise that side slightly, and allow it, with the help of a piece of paper, to flow over evenly. Dispel all air bubbles, lift carefully and put again in the drying-box in exactly the same place as it was before. The plates will dry in one to two hours in a temperature from 120° to 140° Fahr. When dry they are sensitive to light and ready for exposing.

Exposing.

For the purpose of exposing, a frame is required similar to that used by process block makers with a ½-in. plate glass, but without springs or screws, as

the frame may be more satisfactorily tightened up by the use of wedges placed under strong wooden bars attached to the sides of the frame. Place the negative face upwards on the glass in the frame, put the collotype plate on top of it and press them closely into contact by means of the wedges. In order to obtain clean margins, put some black paper on the back of the negatives, which must be reversed; and the simplest way to make these is to put the plate for the negative in the dark slide the wrong way round, but the thickness of the glass must be allowed for in focussing. If two or more negatives be used for the printing, put some strips of indiarubber on the back of the negatives and tinfoil the fronts, so that no light can pass through. Great care must be taken to leave no dust or dirt between the plate and the negative, or the negative and the plate-glass, or a breakage will result. The printing must be judged by looking at the plate from the back. When the picture shows fairly distinctly in a dark-brown colour it is probably sufficiently exposed; but if some parts are finished more quickly than others, make a mask and cover over such parts, leaving the rest to go on exposing. The right exposure can only be learnt by experience, but a good way to gain this is to try the same negative several times on one plate till perfect, and, with the help of an actinometer, the correct exposure will soon be discovered. When the exposure is complete, take the plate from the frame in a yellow light, place it in a dish or tank and wash with water. It should remain in the tank, with changes of water, for about three or four hours, until all the yellowness has disappeared and the picture is almost invisible, but it will show up slightly in relief on the gelatine. When sufficiently washed take from the tank and hold under running water for a few minutes. Then clear the back from waste gelatine with a scraper, wash again for a few seconds and place in a rack to dry, where it should remain for seven or eight hours before printing.

Etching and Printing.

Plates must alw [illegible] lling up, or they will take ink all over.
Put the plate on a [illegible] h first with cold water for five or ten
minutes, after which [illegible] a sponge and dab with a soft cloth
till all water is gone, [illegible] wing solution for about half an hour:—

Thick [illegible]	2 parts
Water	1 part

This solution is [illegible] sed plates.
An under-expo [illegible] etched for half the above length of
time. For over-ex [illegible] able to add a few drops of ammonia
to the etching solu [illegible] ngly. This will help to soften the
gelatine and therefor [illegible]

Two kinds of r [illegible] pe printing—the nap and the gelatine
roller. The leather [illegible] e shadows of the plate. The gelatine
roller is used to in [illegible] nd make the picture look smoother.
When the etch is [illegible] t be done with a clean sponge, dry
the plate with a [illegible] see that the back is quite clean.
Lay a piece of cl [illegible] he bed of the press and place the
plate on this, cam [illegible] e paper all round. Fix the plate by
means of screws or [illegible] r the purpose, which will be provided
with the press.

A litho stone c [illegible] rinting bed. Sprinkle a few drops of
water on the back [illegible] s on the stone as firmly as possible,
giving a very slight [illegible] ed forwards until the plate begins to
hold, and it is then [illegible]

Only good col [illegible] used, mixed with a little thin litho
varnish, and the [illegible] e the ink very stiff. First roll with a

fair amount of pressure over the plate and, if it refuses to take the ink, try rolling very slowly and put in a little more litho varnish, slightly increasing the pressure. If the plate refuses to take ink altogether after this has been done, it is probably due to either under-exposure, over-etching or too cold or damp a room.

Should the plate take ink all over after putting in more varnish, dip the etching sponge in the solution and go over the plate without washing out the ink. This will make the print brighter. Should it still be flat, wash out the ink with turps, dry with a waste sheet of paper in the same way as blotting paper is used, Go over with the etching sponge to take away the grease, and then pour some etching solution on the plate and leave it for 10 or 15 minutes. This, as a rule, will make the plate work satisfactorily.

When using ammonia in the etching solution, always etch again afterwards without ammonia, as it takes a long time before the ammonia evaporates out of the plate

In all these cases an experienced printer would be able to get good results where a beginner would perhaps fail, so it is advisable to keep a note book for reference and always remember that the greatest enemies in collotype are cold and dampness.

Etch by
W. C. Keyse

Photo by
C. B. Keyse

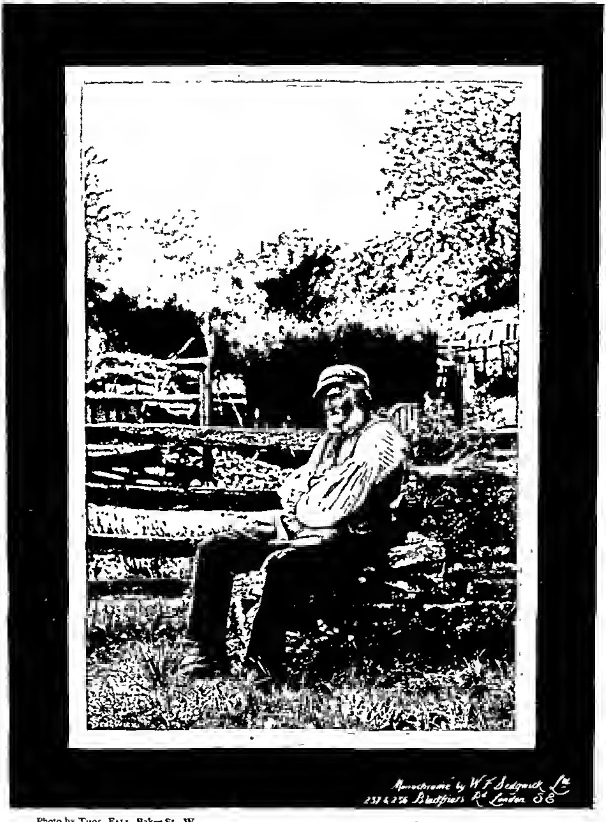


Photo by Thos. Fall, Baker St., W.

THE WOODMAN.

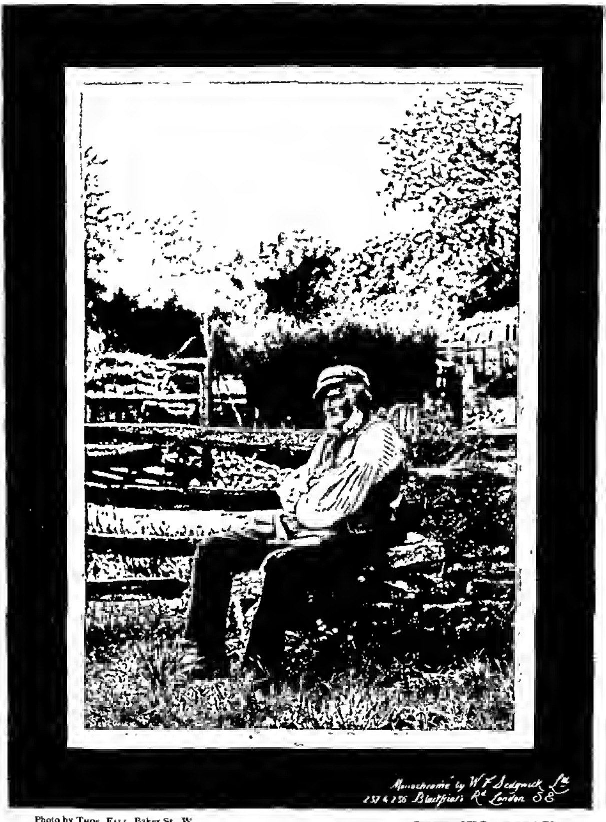


Photo by THOS FALL, Baker St, W.

THE WOODMAN.

Alone, or only accompanied by black, typewriting is quickest to reproduce on a red-sensitive plate—e.g., Lumière B, or RP sensitized collodion emulsion, through a strong blue-absorbing filter, such as a solution of bichromate of potassium. But if there is any red-lettering also, this will not do, because the red letters photograph instead of remaining clear glass. In that case a plate not sensitive to red must be used—e.g., Lumière A, Edwards' Iso or A sensitized emulsion. The same sort of blue absorbing filter is required. Of course the sole object of using orthochromatic plates is simply to shorten exposure, otherwise it would be possible to choose filters to cut the blue out, and with exceedingly prolonged exposure get the same effect on an ordinary plate; it is this lengthened exposure that puts wet plates out of the question.

It so happened that the Editor's honoured invitation to contribute this note was a typewritten letter, in violet ink, on a black and red note heading, so I thought that a good thing to make a test of. In order to prove that it was impossible to get it in the usual way, I exposed a wet plate on it, with the result that though I gave a minimum of exposure the typewriting was next to invisible, more details of the texture of the paper being apparent than of the typewriting.

Having some collodion emulsion by me, I tried that with A sensitizer, and a filter of saturated potassium bichromate 1 part, to water 100 parts, contained in a cell 1 cm. in thickness. This gave me an excellent negative, in which the violet, black and red letters were all equally clear glass, and the white ground of the proper density.

Dark greens offer perhaps the most difficulty, if wanted white, because no plates are very sensitive to green. Therefore if you have blue black on green, as, for example, Penrose's Catalogue cover, it is necessary to use a green sensitive plate (Lumière A, or A sensitized emulsion) in connection with a filter that stops the other colours, but lets through green. Thus in a black design on a mixed white and dark green ground, I have got the black letters to remain clear glass while the ground all photographs quite white, by using

25% potass chromate solution	50 parts
1% acid green solution..........................	1 part

in conjunction with A sensitized emulsion. The exposure required was at least ten times that sufficient for normal black and white.

I do not suggest the filters I have mentioned are the only ones, or the best. It is only the simple principle I would like to put before operators. I have reluctantly mentioned details of practice in order to avoid it being said, "Oh, all mere theory," and so that anyone who desires may put the methods to the test and probably improve upon the particular ones described.

Gathering Winkles

Block by
Wallace & Gilbett

Photo by
Jas M Ilford.

Some Reflections on Half-Tone in Grain.

By Max Levy, Philadelphia.

INTERESTED

Block by T. B. Brown. Photo by Thomas Fall.

IN the early days of the development of processes for the direct reproduction of printing plates from photographs, the efforts of experimenters were confined almost entirely to the production of effects in grain. The earliest published results in this direction produced by Fox Talbot in 1858 were intaglio reproductions, not essentially different in principle from the photogravure process of to-day.

As early, I think, as 1876 or 1877, there were printed (and I believe some appeared in the "London Art Journal") grain plates of portraits which had every appearance of photographic reproduction. I remember very well about the same time some reproductions by Mr. Wenderoth, of Philadelphia, which were made by means of a negative on which a grain had been chemically reproduced; these results were very striking, and I at one time had the negatives, plates and prints in my possession. We had also about that time the so-called ink-photo, which was a relief plate produced by transferring a print from a very coarse-grained gelatine phototype plate.

The introduction of the original Ives process, about 1880, was acknowledged on all hands to be a distinct advance over any of the methods that had hitherto been suggested. The Ives process obtained great currency, notwithstanding the fact that it was far more roundabout and cumbersome than a number of processes known at the time for producing results in grain. It is only fair to acknowledge that nearly all the grain results obtained prior to the development of the Ives process were coarse in texture, but it must also not be forgotten that at that time the whole art of printing finely sub-divided surfaces was undeveloped, so that the early Ives plates were made varying from about 80 to not exceeding 120 lines per inch.

The development of the half-tone process from this point was comparatively slow, until the introduction of my screens in 1890, at which time a sudden development took place all along the line, and especially in this country. This development was so complete, so rapid and so satisfactory that practically all ideas of grain work were superseded, and paper makers, ink makers and press builders set themselves to the task of finding means to do justice to the new results, and to open the possibility of increasing the fineness of the rulings.

Slowly a feeling was developing in which we all partook, that the half-tone process was lacking in certain particulars, and that a 133-line screen (which was the current thing for fine work up to three or four years ago) showed an objectionable amount of mechanical regularity. In other words, the grain in such a plate was apparent to simple observation, and its regularity was regarded as offensive.

For about two years I gave myself almost continuously to a careful study of the grain screen problem, and during that time a change had already taken place to where the 150-line screen had largely superseded the 133 line screen as the standard ruling for ordinary good work, and 175 and 200 line screens had commenced to come into use.

My conclusion at that time with regard to the grain screen (and I have every confidence that time will vindicate the correctness of my view) was substantially as follows: as compared to any particular texture of lined result, the grain screen would have to be very much coarser in general effect to possess the same average printing quality, because the irregularities would produce some portions that would be very much finer than any part of a ruling would be, and that *per contra*, assuming a fine grain, sufficiently fine to be inoffensive, a result from a ruling would be obtained in which a grain would be equally obscure without being nearly so "fine" in the technical sense, and in the requirements imposed upon the press work.

Finally, the introduction of the extremely fine rulings of 200 lines per inch and over, and the ability on the part of the printer to meet the conditions set up by these rulings, opened the possibility of producing plates with a ruled screen in which the texture of the screen was invisible, and which really presented no greater difficulties in printing, if as great, as were presented by a grain result in which the grain, by reason of its irregularity, was very apparent.

My studies of this problem led to experiments with composite screens, and finally to the production of the four-line screen, which was a distinct advance in many ways over anything that had been done, but the very great difficulties of commercial production led to their practical withdrawal. I might point out in passing that the establishment of J. Malvaux, in Brussels, which acquired the Belgium patent for the four-line screen, have it in constant use on current work, and they feel with me that the results from this screen cannot be equalled by the cross-line, or any grain result hitherto produced.

Last year, while attending the Paris Exposition, I was very much interested in some experiments that were being made in my presence at the Malvaux establishment with the clever grain screen produced by Mr. Wheeler. The procedure with this screen indicated to me that while it might possess some advantages for occasional work, it certainly did possess decided limitations in its general application.

In order to convey an idea of what the cross-line screen will come to in the future, or indeed what it has already come to, I submit with this article an impression from a plate produced with a 400-line screen, a screen in current use in two or three establishments in New York.

Block by
Gilchrist Bros

A Litter of Piggies

Photo by
Thomas Hall

". . . . . Beneath the forest's wings
Melts the white glitter of a hundred springs."

Example of Half Tone Work with
Max Levy's 400-line Screen.

A DUTCH PASTORAL.

Half Tone on Zinc by
GEBR DELGEUR, Rotterdam

After a Painting by
A MAUVE

THREE LITTLE JAPS ARE WE

Block by
GILCHRIST BROS

Photo by
BYRNE & CO

A SUMMER
GARLAND.

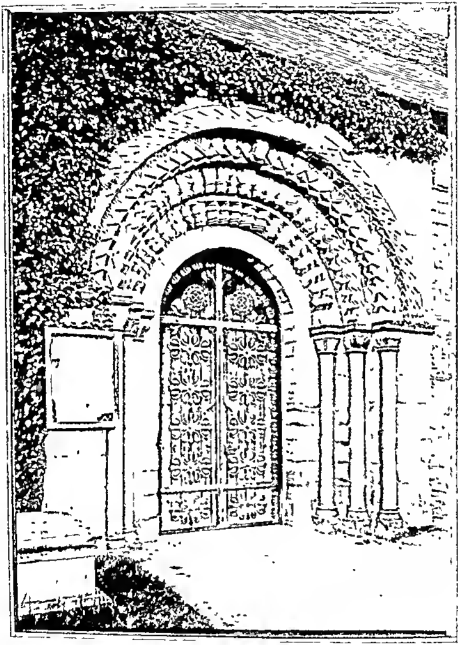
Example of Work done with
Wheeler's Metzograph Screen

Blocks by
J. Löwy, Vienna

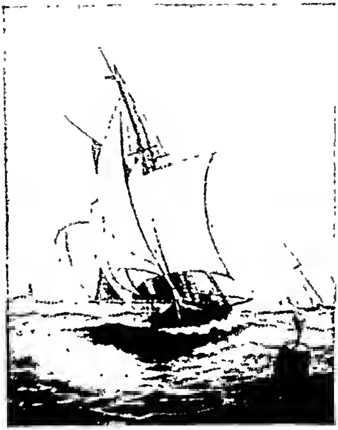
GOOD-BYE, DADDY

Block by
Bursill & Ladyman, Ltd.

Photo on National Dry Plate by
F. G. O. Stuart.



NORMAN DOORWAY
Henley-in Arden, Warwickshire.



THE YACHT AMERICA

The Winner of the America Cup

Reproduced from a Water Colour by
The [illegible] Engraving Co., Philadelphia

naturally be clogged up more or less in printing, as fish glue is quite thick and spongy, and ink is also smeary, and tends to spread when heated

As a rule negatives in America are all made much finer in regard to lines per square inch, as we have the best typographic printers in America that the world can produce. They may spend a lot of time in make-ready, overlay and underlay, but you should see the eyes Europeans make at our fine catalogue printing, with plates that they call shallow at that, and they are shallow compared with European cuts. I cannot understand how some of the cuts print at all when one sees the old rickety presses they are printed on. European engravers are to be pitied. They have not printers here like we have, and, with old-fashioned presses, cheapest ink, cheapest paper, you have the reason for the poor work in a nutshell This cheapness does not pay, and so long as this evil prevails European cut makers will never catch up to us.

Now to proceed. After the negatives are made they are generally lined around on the negative, cutting through the film so as to leave clear glass, which then, of course, makes a fine solid line when printed. After that the negative is coated with rubber cement, just thick enough to prevent one collodion dissolving the other, when dry collodion is poured on, this being composed of gun cotton, alcohol, ether and castor oil If the plates are wanted in a hurry the collodion is burned over a flame, and it dries very quickly. Now they are cut around and placed in water and acetic acid, which loosens the albumen underneath the film. Then a number are placed on a quarter-inch thick glass (called flats in America), say 12 by 15 inches. When full of films, with just separation enough for the saw to run through, the plate is dried with paper and squeegee. The printer already has his copper and zinc all the same size for these flats cut in stock, and coats it while the negative is drying. The films do not curl up when dry, as I have seen in some German shops. If castor oil is put in the stripping collodion they will hold fast by themselves, and be free from wrinkles.

We next come to the printing, which is done now mostly with my dry process, as that enamel solution is specially made for all metals, and the American is not going to use four different printing solutions if he can get one that will do for all. There are yet some firms in America who have not secured my process, mostly small firms. They use albumen and fish glue, whilst in Europe they use the blue process, the asphalt process and the cold enamel process. They are now adopting my process to a considerable extent, but, like all things new, it is slow work. When the plate is printed, if it is a half-tone the whole flat of them is given an etch of about seven to ten minutes, in perchloride of iron 1 oz., water 3 ozs. We in America buy mostly perchloride of iron in carboys, all prepared, whereas the majority in Europe use the salts in the lump, and dissolve the same themselves. This does not etch half as well as iron bought already prepared, as we think that chemists can do these things more accurately than we etchers. There you are, "cheapness" again, thinks the German. I do not think so at all. After they are etched they are proofed and sawed up, and the finishers or fine etchers do the rest. They paint in, re-etch wherever needed, and burnish in grey places, whilst frequently adding hand engraving. But it all goes very quickly; much more quickly than on the Continent. The rest, of course, is as usual. The plates are mounted on wood, underlayed in case of vignettes, before putting in a block, and frequently mounted on metal bases; in square work it is bevelled, generally with a Royle Beveller. This again is an advantage: Americans possess *up-to-date machinery*, which is sadly lacking in a great many European shops.

In colour work a great boom is on at present in Europe, and as most shops in Europe have a director who is a man well up in technique, the Europeans are at present forging ahead of the Americans in that line. Though the results are

excellent, they make one mistake, and that is, they do the work too cheaply. Here in Europe colour blocks are made for about 75 cents a square inch (3s. or 3 marks), as against \$1.50 to \$2.00 (6s. to 8s. or 6 to 8 marks) per square inch in the United States. For the benefit of Europeans I wish to say that the National Association of Photo-Engravers of America are trying to abolish the square-inch system of charging for cuts, and in a great many firms this has long been a rule. This association is something Europeans ought to have, as it would, no doubt, in time improve them financially, and would enable them to work together and obtain higher prices than they are now receiving. It has worked wonders in the United States, and the greatest rivals in business have now become the best of friends.

As I first arrived in England I will dwell upon English etchers first, for the edification of my American friends. London, of course, is the city with the greatest number of photo-engravers. There are over 70 to my knowledge and some in little alleys that I never shall find out. The largest of them is Carl Hentschel, who is, no doubt, the boss engraver of England. He owns several shops scattered over London in different names, but they are his anyway, and he is reaching out for more. The business is enormous, employing about 300 hands, with ageocies in the north of England, so that he practically gets the bulk of English work. It wouldn't surprise me if Mr. Hentschel started a branch business in New York or Pretoria (after the war is over, if ever it is over). This is the firm which has an athletic club of its own, that Americans have heard so much about. The firm of Carl Hentschel are up-to date for speed, and in colour work they are the leaders in London. The firm of Lascelles I will mention also because they are doing all their work with dry-plate negatives entirely, and I wonder why Americans don't do likewise. The work is all done on zinc about ⅛ of an inch thick, if not thicker, so as to avoid bending, as they do very large plates. They work very fast here, as they make plates for a leading London illustrated paper as a specialty. The Press Etching Company are also an up-to-date shop. They are growing very fast, have recently bought out Plummer & Co., and are going to make some of those London houses hustle. They believe in American machinery and methods, use the dragon's blood process, as well as my process, which they are using with great success. Another engraving house, that is entirely American in its way of working, is that of Sir George Newnes, Ltd., which Penrose & Co. fitted up entirely, and it makes one feel at home to be there. It is conducted by the able Mr. J. S. Sunderland, of whom Americans often have heard in lectures in various trade papers, and who has with him one of our American etchers, Mr. Bond, who is foreman, and who gets more work out of his men than anyone else in London; he has American ideas all right. There are other large firms too many to mention, but I must say a few words about John Swain & Son, who employ upwards of 100 men. Operators here work the silver bath still, except a few who work dry plates. The collodion emulsion of Dr. Albert is being introduced, and all through the efforts of Messrs. Penrose & Co., who are working hard to teach the conservative English operator how to use it. They have special rooms at Penrose's for the operators to learn the use of collodion emulsion. They are taught by Mr. Klein, their expert, and before I go home I am going to learn it myself, for it is the greatest thing out.

In England, prisms being used generally, each plate is printed separately, which is very tedious, to be sure, but they will adhere to old-fashioned ideas and keep behind five years or so. Copper is used a great deal, more so than in Germany, and it is printed in enamel, or gum arabic solution; zinc, with albumen. The rest is done as usual in Europe, line work being rolled up after each etch, instead of dragon's blood powder, and it is a beastly slow process.

Yet they have been shown time over again how much quicker our American system is, and still they keep on the same way. I have personally shown a few London firms how to work it, and some have at last been convinced. They used to complain about poor dragon's blood, having got it at a druggist's instead of Penrose's, because it's a little dearer at the latter place. For my dry process, several firms have been convinced that Penrose's zinc is better than the Belgian, French or German. It is a trifle more costly, but it is hard, and does not crystallize in burning in, and, as my process needs less than half of the heat needed by fish glue, it does not hurt it one bit, whilst it etches beautifully clean and sharp. It is this beastly habit of going in for cheap chemicals, etc., that gets process engravers all muddled up, and I don't sympathise with them one bit. I can recall three instances where firms complained about their enamel coming off, and on investigation found that instead of using bichromate of ammonia they were getting bichromate of potash (got it round the corner at some cheap druggist's, because "it's so cheap"). Yes, and they had to expose half an hour, when even then it came off, and ruined several dozen plates. The druggist never keeps bichromate ammonia anyway, and never has a call for it, so he gives you potash, which looks like it, he thinks. The poor engraver gets it, and is all "twisted," blames it on the fish glue; or if it is my process, on my chemicals being wrong; or thinks the weights unreliable. You see and hear many such things when you have travelled four years amongst engravers all over the world, as I am doing.

Many engravers do not possess routing machines, and etch all the way, which takes about four hours, and for bevelling they use a shoot board and plane. The way they bevel is a caution, besides the hard work which is required to manipulate it. All such things have a tendency to limit the output of work, and if a small firm gets a large order, as often is the case, and have a certain day to finish same, they cannot do it, as their facilities are not there. So away goes the order to some large fellow, and the smaller shop is out of a job. In my opinion it pays to instal machinery, even if it is idle at times. Outside of London there is not much in the engraving line, as England, being so small, is so thoroughly canvassed by London agents that work from Birmingham, Manchester, Glasgow, etc., generally goes to London. Owing to this I found very small concerns in English cities in general.

One thing that I can say is that English shops are very nicely kept, well ventilated, and some that are in the suburbs are a dream, out in the open meadows, fresh air, sunshine, etc.; it makes one feel happy to think of it. I *must warn American etchers against coming to England to get work—it is the worst thing they can do.* They stand no chance whatever of getting employment. They don't want any dragon's blood etchers in England, and the American does not know about rolling up; never heard of it. He will not get much encouragement from the English workmen; they are too much for self. "The blooming Yankee coming here to show us something again," is all you'll hear them say. There were several American etchers on their *uppers* last year in London, so others had better take a fool's advice—stay at home. They will be lost here, and there is not the money here that there is at home. Etchers here don't get half as much as in New York. After all, there is only one country for a poor man—that is the United States of America. I hope they will heed my advice, as I want to save them any heart-aches that they may get by coming to England to look for work.

Let us now compare the German, the Hollander, and the Belgian, and I will endeavour to depict the German engraver as he really is. In Holland they work on the same style as in Germany; also in Belgium. It is sad, but true, that the German is gradually dropping copper work, and is striving to do everything on zinc, all with the albumen process, as the zinc here is so poor that

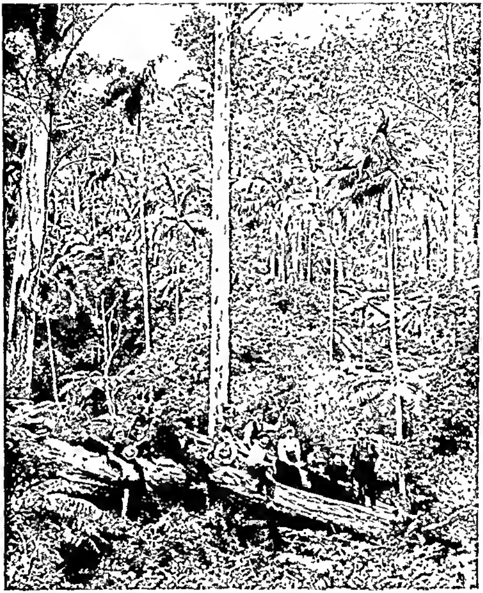
THE NUN

Block by
T. B. Browne, Ltd.

Photo by
Byrne & Co.

EGYPTIAN TROOPS STORMING A FORT

Block by
TH VAFIADIS, Constantinople.



NEAR TOOWOOMBA, QUEENSLAND.

Block by
JAMES CLARK Brisbane

Photo by
BAIN.

THE HELENA RIVER

A typical Western Australia River Scene

Photograph and Copper Etching by
W. A. Smythe, "Western Mail," Perth, W.A.

MISS MARIE STUDHOLME

Block by
George Newnes, Ltd

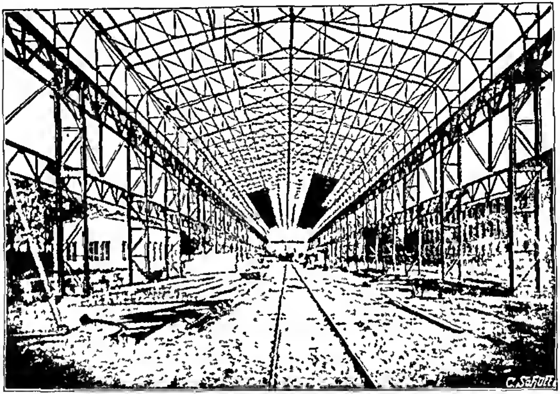
Photo by
Alfred Ellis & Walery

THE CZAR

PROFESSOR VIRCHOW

Blocks by
C. SCHÜTTE, Berlin

Examples of work done by
Hermann J. Schmidt's
Dry Enamel Process



MACHINERY HALL, DUSSELDORF EXHIBITION.

Block by
C. Schutte, Berlin.

Example of work done by
Hermann J. Schmidt's
Dry Enamel Process.

if they burn in a little the plates crystallize, so that they wear down in quick time on the press, and very often break right in two. The chief reason for dropping copper is on account of its being so expensive. In the United States copper costs 100 per cent. more than zinc, and here in Germany about 300 per cent. more, so they aim to put all work on the cheaper metal. I myself do not believe, and never will, that zinc etches quite as well as copper, and no cut on zinc can be expected to compare with one etched on copper. There is cheapness for you again. The German workman works for a very small salary, and is a good workman; but, oh, so slow! Eight hours a day is his working time, and, considering his small pay, I suppose he is justified in being slow. As for systems and methods, I'll explain them as well as I can. Albumen is the solution used mostly in printing, and, as I said, 90 per cent. of the work done in Germany is on zinc. It is an awfully slow process, as all will admit, and ten years behind the times. Prints are often missed, and after an etch a proof is taken. This again has to be rolled up carefully and powdered with asphaltum for further deep etching. So it goes on. A plate has to be rolled up several times before it is finished, making it entirely much too slow. Their zinc is of such a poor quality that the little heat needed to melt the asphaltum powder often crystallizes the plate, so that using an enamel other than my dry process is out of the question. In etching line plates it takes Germans 2½ to 3 hours, while in America there are hundreds of etchers who with the dragon's blood process etch nine line plates in a day, or one an hour. The Germans, when you see them etching, are continually using rollers, which is so different in America. It takes some skill, of course, but to my idea the less rolling up a plate has the better the results. The other work, such as mounting, is done in the usual way. There are many shops which do not use routers at all, simply etching almost through. They don't understand the routing machine and its value. Some have their routers up in an attic stored away as "no good," until some chap comes along and shows them how to use it, when they feel mighty happy, I tell you. As the methods in Germany are different from the American, it also implies the same here in regard to finding employment. An American can't work here at all. They would laugh at him if he made plates his way, and would think it no good, even if it was, just because it was made with another method and more quickly.

Among shops here in Germany the largest and best is that of Meisenbach, Riffarth & Co., in Munich, also with branches in Leipzig and Berlin. It is a question whether Meisenbach's is larger than Carl Hentschel's in London, but Meisenbach's shop is certainly the best equipped and most up-to-date in the world as regards facilities. I've seen a great many plants, and there are none that can beat it. They are the biggest block makers in Germany. Then there are other large firms in Munich, as Bruckman, Hamhöck, Oscar Consée, Brend'Amour & Simhart, and several small firms. It is here that Dr. Albert resides, has his collodion emulsion factory, and is one of the most popular men in the process line in Germany. He is too well known to go into details.

From Munich I went to Leipzig, and visited the great firms there as well. Leipzig is the city noted for its printing establishments, of which there are about 300, and, in consequence, many cuts are made here. The best work in the engraving line is made by Dr. Trenkler & Co. They are not the largest firm in Leipzig, but do the finest work, using mostly 200-line screen. From Leipzig I went to Dresden, where I found only two engravers, one having only three men, and the other wouldn't let me see his place, so he couldn't have had much to show. From there to Berlin, where I installed my process in the establishment of Mr. Carl Schutte, who also secured the licence for all Berlin. Mr. Schutte is the most energetic man I ever met, full of push, and thoroughly

THE GNARLED OAKS

ock kindly lent by
hn Watson & Co., Glasgow

From a Photo by
George C. Watson.

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isn't a new thing that they don't oppose, and they stand in the way of progress. What is more sad is that they are influencing other engravers in smaller cities to form unions, to break the ties of friendship formerly existing between employer and employé. Here in Europe this is not the case at all, though unions exist in some countries, and a man runs his own business, whilst matters are turned round in New York—and the men run it for him! He dare not make a negative, and the half-tone operator dare not make a line negative. The tone etcher doesn't touch line work. What tyranny this is! However, from last reports there was discord amongst their own organization, and the bubble will burst some day. Here in Germany men are respected for their obedience to their employers, are paid in case of sickness, and are given a holiday every year. Such a contrast to New York. There both parties are at swords' points all the time. We had nice times in New York seven years ago; no unions to worry our minds, and they will come again, that is certain.

De Montalbahnstoren
A View in Amsterdam

Block by
Gebr. Delgeur

SHEEP AT THE FORD

A FLOCK OF GEESE.

Blocks by
Geo Newnes, Ltd

Photos by
Reid, Wishaw

Block by

THE FLOWER SELLER

PORTRAIT STUDY

Block by
H. R. Shipton & Co.

Photo by
Russell & Sons.

RULE BRITANNIA

Block by
PHILIPSON, SON, & SKILLETER

Photo by
BYRNE & CO

COMPANIONS

Three Colour Process and Printing by
The Arthur Cox Illustrating Co., Ltd.

Photo by Arnold J. Tanner.
Enlarged and worked up in
Water Colour with the Aerograph by
Chas. L. Burdick.

On many occasions, when complaining to publishers and others who handle view work about the quality of the photographs supplied, I have been met with the remark, "Oh, we can't get them done any better. You must touch them up." Now, this touching up is getting quite a serious matter. In the first place, it should not be necessary except to a very slight extent; and in the second place there is the difficulty of finding artists to do it. There is a great deal more skill and knowledge necessary to properly work up a photograph for reproduction than most people are aware of. A man to be really good at this work must have a sound knowledge of mechanical drawing, and be sufficient of an artist to be able to work up views and portraits artistically. It often happens that a draughtsman who can draw pattern work can be got to work up photographs very well so long as they are strictly mechanical subjects, but he is not a success if you ask him to add a few figures and some clouds into a landscape, whereas a man who happens to be sufficient of an artist to do this will consider it quite beneath his dignity to touch a photograph.

MRS T EYRE MACKLIN.

Facsimile Half Tone by CARL HENTSCHEL, LTD — Photo by D BLOUNT.

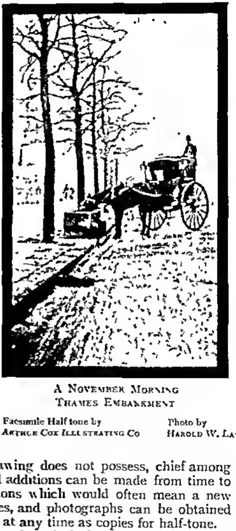
The work must be very carefully done, with a full knowledge of what will copy and what will not, so as not to waste time in doing work which will be lost in reproduction. For instance, there were recently given to an artist some half-plate photographs to work up which had to be reduced to $3 \times 2\frac{1}{8}$. The blocks were to be charged at the usual rate, and the customer would not expect to pay more than 2s. each for the working up. When they were brought in the artist said his price would be 6s. each, and he could not do any more at the price. Now he had actually stippled them all over with a fine brush and a transparent colour, and the effect was very little better than before he began, except for a few high-lights here and there. Another artist then took one in hand and completed it in forty-five minutes, the effect being just what was required, because he had the requisite knowledge of what would copy and what would not, and unless the artist is constantly in touch with the reproducer it is almost impossible to teach him how to work up a photograph properly; in fact, it is an entirely new business with very few workers obtainable.

For the information of those who are interested in this branch I will offer a few rules for guidance. Always use body colour wherever possible, and remember that a dull or matt surface always copies lighter than a glazed surface, and any working

the colour is dry, carefully avoiding streaks and specks and bubbles, which are more liable to form if the gum is not laid on quickly, or if the brush is passed over a portion that has become partly dry; also that sepia forms a better base for the body colour than black, as the mixture of black and white nearly always approaches blue, and blue shades must be avoided by every means possible, both in printing processes and in working up.

The next class of copy to puzzle the reproducer is that from which *facsimile* reproduction is required, and I consider it a lucky thing in more ways than one that half-tone is not necessarily a *facsimile* process: Firstly, because it would limit the applications of the process; and, secondly, because if it were, the services of the average photographer would not be in such great demand.

There are certain publications which, of course, must have *facsimile* as far as possible, but this does not depend entirely upon the half-tone man, as paper, ink and machining have quite as much to do with the final result. But given suitable paper, ink to match the colour of the original and a smart machine man, *facsimile* in half tone is not altogether impossible. A notable example of this is the *Photographic Art Journal*, Leicester. The editor's instructions are to represent the originals in tone and texture as closely as possible. There are other publications which issue instructions to the effect that there must be no fine etching whatever. Now, it is rarely that the first proof off a half-tone plate is a good representation of the original, no matter how carefully the various parts of the process have been carried out, and if these instructions were taken literally the result would be very poor compared to what a skilful fine etcher can do to bring it closer to the original; and this, I think, is where the true value of the fine etcher lies—that is, the art of correcting the natural shortcomings of the process without his work being obvious.



A November Morning
Thames Embankment

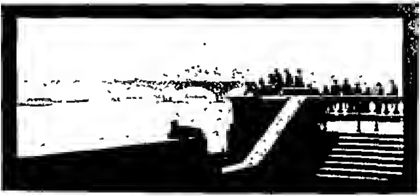
Facsimile Half tone by Arthur Cox Illustrating Co — Photo by Harold W. Lane

There is another class of copy which is gaining favour of late. I refer to the plastic modelled designs for book covers, title pages, trade cards, etc. The initial cost is rather high compared to a drawing, but there are several advantages which a drawing does not possess, chief among which is the ease with which alterations and additions can be made from time to time if the model is taken care of. Alterations which would often mean a new drawing can be readily made in these copies, and photographs can be obtained after each such alteration, which can be used at any time as copies for half-tone.

As to copies for the three-colour process, there is little to be said. Almost any kind of coloured copy will give good results, provided it is produced with a little knowledge of the requirements of the reproduction in general. Many artists use gum to brighten certain portions of their coloured sketches. This is a

very useful medium, as already pointed out, for giving depth to any colour, but great care must be exercised not to let the gum encroach where it is not absolutely required, and also to see that all parts are covered where it is required, as it makes a far greater difference in copying than can be judged by the untrained eye. I have seen excellent drawings quite spoiled by carelessness in this respect.

Just one word more in conclusion. The path of the reproducer is not a rosy one even when his copies are all that can be desired, but when most of the unsuitable ones could have been better if reasonable care had been bestowed on the minor details, it is not conducive to making his lot any easier or his temper any sweeter.



TEMPLE STAIRS, THAMES EMBANKMENT

Facsimile Half tone by
ARTHUR COX ILLUSTRATING CO

Photo by
HAROLD W LANE

The Originals of the Photographs by Mr. H W Lane on this and preceding page were produced by means of "Tabloid" Photographic Chemicals

THE FAIRY GLEN, Nr PENMAENMAWR

Duplex Half Tone by the
ARTHUR COX ILLUSTRATING CO., LTD.

From Photo by
MR ARTHUR COX.

Photographic Study
and Block by
Fredk. Downer
and Sons,
Watford

BOAT, SIR?

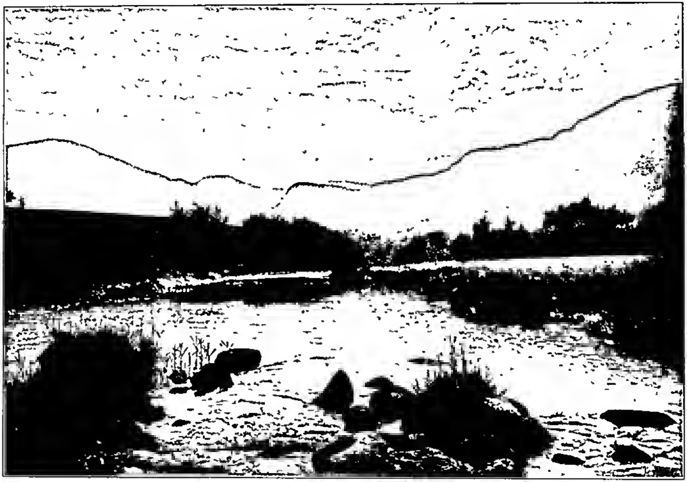
Half-Tone on Copper by
VAUS & CRAMPTON, LTD

Photo by
BYRNE & CO

"THE MODERN WOMAN"

A Suggestion to the Rational Dress Society.

Half-Tone on Zinc by
"HELIOS," Rotterdam.



THE HOUR OF REST

Half-Tone Etching by
Milleff, Hawkes & Co

Copyright Photo by
Graystone Bird

PORTRAIT STUDY

Copper Etching by
C. Angerer & Göschl, Vienna

From a photograph by
Gebr. Lützel, Munich

THE PICTURE BOOK.

Copper Etching by
C. Angerer & Goschl, Vienna

From a photograph by
Gebr. Lützel, Munich

to slide along the diaphragm plane the device will become automatic. It will then indicate the screen distance as soon as the subject has been focussed.

Such an apparatus would be theoretically perfect, but very inconvenient to work with. The sliding end would require an impossibly large surface to slide on, and there would be trouble from friction also.

This defect is overcome by providing a joint at C (fig. 2), the middle point of AB, and pinning both ends of the rod AB to their proper planes. The pinning must be done in such a manner that the line joining the points A and B is perpendicular to the diaphragm screen and image planes (*fig.* 3).

THE WITCH OF GHOOM

Reproduced with 110 Line Screen — Photo by F. Kapp & Co., Calcutta.

Here we have an instrument simple, effective and accurate. It can be adjusted to meet every case the operator is likely to deal with, and can be fitted to any camera possessing a screen gear in which the screen distance can be accurately read from the outside. Thus it is also universal in its application.

In the writer's establishment screen adjustment is now invariably done by means of the "Screen Adjustment Indicator," *instead of by microscopic* examination, as formerly was the practice. The negative for the "Witch of Ghoom" was done with a multiple stop with sixteen holes, thus proving that the machine was put to the severest possible test. After this no room is left for any doubts as to its power of accurate adjustment. It will indicate any *definite* screen distance with absolute accuracy.

By "definite" it is not meant that anybody's pet ideas about screen distances are to be adhered to. But it is insisted upon that the operator should have a clear idea of what he is about. When he advocates any particular screen distance for any particular case he should, consciously or unconsciously, do so on the basis of some fixed proportion between the screen distance, camera extension and lens aperture; otherwise he *cannot claim to be called an accurate worker.* Of course, beginners and amateurs will absolutely rely upon Penrose and Company (the patentees of the invention) to send them cameras and lenses fitted with "Screen Adjustment Indicators" set to the most approved screen distances.

I do not think I need say much about the details of actual work. The machine can be made to meet all cases. There need not be any difficulty for those who vary their screen distances according to the character of the copy. The "Indicator" will give the screen distance for a certain class of subjects. Shorter or longer screen distances than this can be employed for bolder or flatter

subjects. A smaller or larger stop will serve the same purpose. Where more stops than one are used during the same exposure every kind of subject can be dealt with by judiciously varying the time allowed for each stop.

HALF-TONE DIRECT FROM NATURE

Taken direct with
Levy's Four-Line Screen

Negative and Block by
U. RAY, CALCUTTA

The problem of the mechanical adjustment of the screen admits of a variety of solutions. The principles of virtual velocities come very handy in solving this

blem. The purely geometrical solutions are, however, much simpler and neater.
The chief effect of automatic screen adjustment will be to obliterate the erence between half-tone photography and ordinary photography Anyone h a good knowledge of ordinary photography can now make a half-tone gative with the help of a Screen Adjustment Indicator. Thus, while on

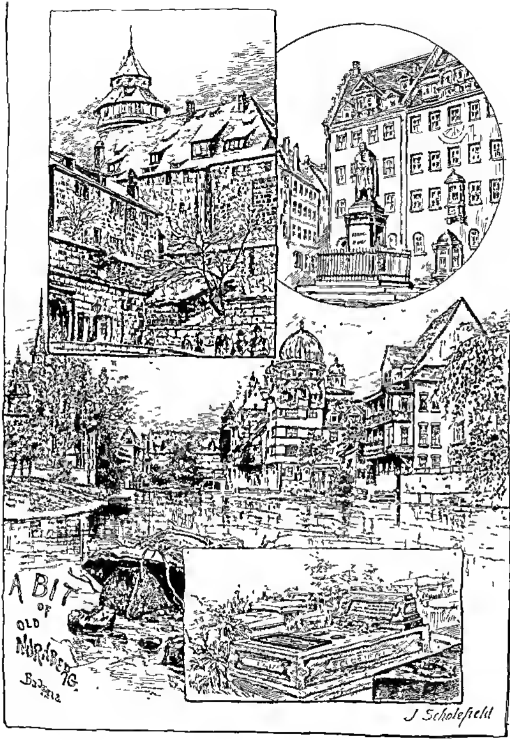
A Novel Screen Texture

Negative and Block by
U Ray, Calcutta

the one hand the cost of negatives will be reduced owing to decreased demand on the operator's skill, the average quality of work, on the other hand, will be improved, owing to the element of uncertainty being eliminated from the most vital portion of the work. Amateurs may henceforth be expected to take more kindly to half tone photography.

FÉLICITÉ D'AMOUR
(Felicity of Love)

Three-Colour Process by
TH. VALIADIS.
Constantinople.



Zinc Etching by
THE UNIVERSAL PROCESS CO

From a Pen and
Ink Drawing by
JOSEPH SCHOLEFIELD

"HELPING MOTHER."

Three-colour Reproduction

BY

André & Sleigh, Ltd., Bushey, Herts

The Progress of Three-Colour Printing.

By Frederic E. Ives, Philadelphia.

INNOCENCE

y Tone Co., Ltd — Photo by Graystone Bird

IT is now twenty-three years since the writer, in a talk to some of the students at Cornell University, prophesied that within ten years books and periodicals would be illustrated by photographs in colours printed in the type press; and it is twenty years since he made a small but good example of three colour process work, printed from half tone process blocks, and distributed copies freely, with the expectation that the significance of such a result by such means would be at once recognised. Not even the optimism of youth could stand up against the absolute indifference with which the suggestion was received, and a struggling workman naturally shrank from undertaking a method so revolutionary in character that its practical perfection and commercial development would not be possible, without securing the earnest interest and efforts of press builders, ink and paper makers, printers and photographers.

At that time orthodox conditions for fine printing were soft "plate" paper, a soft tympan, presses structurally not half as strong as they are now made, heavy, opaque coloured inks, and ink distribution which would now be considered ridiculously inadequate. A change to the conditions which the writer recognised as necessary for the success of his idea would have been regarded not only as revolutionary, but as impracticable. Nevertheless, this revolution, which one man could not hope to bring about, has been slowly taking place, chiefly by reason of the introduction of the half-tone block process, which, for its most perfect development as a means of illustration, demanded, and finally compelled, most of the improvements and changes in machinery, materials and methods which were so essential to the development of three-colour printing.

With the development of these improvements the idea was taken up by others (though not until ten or twelve years after the writer's first example was given out), and a sufficient degree of success was achieved to establish confidence in its ultimate success and importance, even though every undertaking for years resulted in commercial failure.

Until quite recently, notwithstanding the improvements in conditions which have been cited, and a steady improvement in the commercial aspect of three-colour printing, there remained some stumbling blocks to complete success, the most important of which were, first, the amount and quality of labour required to perfect the printing blocks, which were seldom, if ever, satisfactory as left by the process itself; and, second, the difficulty of perfectly controlling the putting down of the coloured inks and registration of the colour prints.

The first of these difficulties was due to two quite distinct causes. The first, faulty colour analysis in the photographic process, or unsuitable printing inks, or both, a subject upon which the writer has perhaps said enough for the present. The second was the difficulty, not to say impossibility, of preserving the exposure

and density ratios through a multiplicity of photographic operations carried out separately for the three elements of the colour record. Anybody who has had experience of Kromskop colour photography and been made thereby to realize how very small a departure from correct exposure and density ratios will perceptibly alter the colours, or at least change the colour key, will recognise the objections to carrying out such operations separately for the three elements, especially as when three separate negatives are made first, then three prints or transparencies, then three half-tone negatives, then three etchings, as is the practice in many houses to this day. It is true that by something little short of a miracle one might, after all this labour, get a good result; but it is a fact that generally so much skilled work has, after all, to be done upon the blocks themselves that the cost of the work is greatly increased and the quality made uncertain.

It is no less true in this work than in Kromskop colour photography that the ideal condition is to have only "one negative plate, one print," by which the amount of labour and the number of chances to go wrong are reduced to a minimum. Such conditions the writer has already realized in a small experimental plant, a description of which will be published at a later date.

On the principle that "fools rush in," etc., the second great difficulty, that of perfect inking and register, which, to anyone who had a knowledge both of the principles of colour mixture and of the effects of changing atmospheric conditions on paper and on ink distribution, could not fail to appear very formidable (we are assuming that fine, accurate results are demanded), were declared to be trivial, and many very costly lessons were learned by sad experience as soon as attempts were made to do a really high class of work commercially. If the printing of one colour is started on a dry afternoon and finished on a wet morning, the prints will vary both in depth of colour and in size; or, if they are made under conditions which make them uniform, the conditions may be altered when the second colour is put down or during the run. Differences in inking, which would not be noticed in chromo-lithographic work in many colours, will throw a three-colour print out of key, and registration which might be considered "good enough" in chromo-lithography would often be quite unsatisfactory in fine three colour process printing.

All these difficulties might vanish if the three impressions could be made in quick succession, without waiting for inks to dry. The effects of atmospheric changes might then be the same for all three impressions; and even though the impressions at the commencement of a run might be darker or lighter than at the end, and the paper damper or dryer, the "ratio" would remain constant, and the colours of the finished prints not be thrown out of key. These conditions appear to be fairly well realized in a "multi-colour, alternating carrier" printing machine recently perfected, and which, if it fulfils its promise, will remove the last great stumbling block to practical success in three-colour process block printing.

We shall then have:

Only one negative to make.
Only one plate to etch.
Only one run of the sheet through the press.
The best results by the simplest means.

English and American Electrotypers.

By J. S. Sunderland.

A TYROLESE COURTSHIP

Block by George Newnes, Ltd. — Photo by Ch. Scolik

THE comparative merits of American and English electrotypers have to be classed under different headings—*A*: electrotypers on both sides of the Atlantic who are successful, masters or men, who make the business a success from a technical as well as financial standpoint, with proper facilities for so doing. By this is meant a good, efficient, labour-saving plant as well as properly selected assistants who are able to contend with any kind of work, producing it in smart time as well as with that great desideratum of so much importance—high-grade quality. The establishments where this, in England, is most in vogue are large printing firms where the work is under special charge of properly qualified men, also the electrotyping departments of the principal illustrated weekly papers. Excellent work is done in connection with these papers on the English side; the best work in America appears to be done by the magazines, but for smart work in electrotyping the best appears to the writer to be the production of the American weekly coloured supplements. The question as to which is the best—English or American electrotyping—is very hard to answer. The methods used are different, although it must be said in the English electrotyper's favour that he is able to do marvellous work with the almost obsolete machinery with which he usually has to work. Americans who visit some of the English electrotypers are astounded at the results obtained and the speed, considering the old-time tools with which the men have to work, and express themselves with the argument—If your fellows can do this work with these antediluvian machines, how they could hustle with a high-grade American plant; which goes to show that the Englishman in this business is pretty sharp, and only lacks the opportunity to do even better. One of the peculiarities of electrotyping is that lookers-on do not see much of the game—to state it differently is that numerous minor details which appear to have but little effect are most important, the whole process bristling with technicalities. This, no doubt, is the cause of the class *B* electrotypers, who are working under difficulties, with inefficient machinery, want of method, and who have the idea that anything constructed or called a machine that will obtain some sort of result answers the purpose. Unfortunately there are a number of this class in England; the sooner the right methods are adopted of having proper appliances the better for all concerned. This state of business is not always the fault of the electrotyper himself so much as unqualified advice when starting foundries; it is an easy matter to order the wrong machine, but not difficult to have the right appliance,

if left in proper hands to supply the best, which will prove the cheapest in the end. This has often in the past been the case, owing to the rapid growth and wide spread of the electrotyping and stereotyping trade in a few years. There are now better facilities than formerly for having the right kind of plant suited to the particular purpose for which it is intended. No doubt in the future, when the general re-organizing takes place, some of the obsolete machinery at present in use being discarded, we shall hear that the English all through is as good and in some cases even superior to the American electrotyper taken on the average. At the present time the American has the advantage of better machinery than the much-worn English patterns in use. One other difference between Americans and English is the better social standing of electrotypers and stereotypers in America in the printing profession, it being acknowledged that the plate is the pivot on which hangs the whole scheme of good printing in England, the printer at times making mistakes, always saddling the blame on the plate maker, no matter from what cause. The standpoint which the American electrotyper usually takes is showing by ocular demonstration in the form of good proofs that everything is all right, thereby confounding any further discussion. By so doing he is able to take a better stand in the printing world, for what an electrotyper can do a printer should be able to do likewise. This is another cause of the apparent superiority of American electrotypers, a point which all Englishmen in the same line should adopt wherever possible. There are many arguments outside these, but it is too long a story.

The Cupbearer

Block by
George Newnes, Ltd.

Photo by
Byrne & Co

LYNCH LAW

Half Tone Block by
Carl Hentschel, Ltd

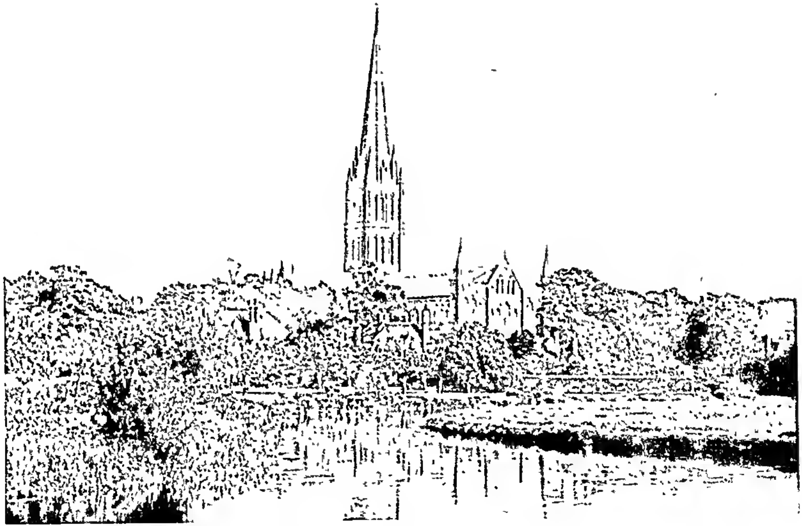
From a Drawing by
Stanley Berkeley.

FATA MORGANA

From the Painting of
G. F. WATTS, R.A.

Photo by
F. HOLLYER, Kensington

Block by
ACME TONE ENGRAVING CO., LTD.



SALISBURY CATHEDRAL

Block by
London Stereotype Works Ltd., Birmingham

From Negatives by F. G. O. Stuart.
On National Dry Plate

A SCENE FROM "THE EMERALD ISLE"

Block by
Art Reproduction Co. Ltd

Photo by
Alfred Ellis & Walery.

THE MADONNA OF THE PAPER STORK.

UTAMARO.

Reproduced from
a Japanese Print

By Chas. E. Dawsn.

WE have most of us heard the stcy of the miner who, on beholding the rare apparition of a tourt, remarked to his companion in sublime intolerance of a creatre so unlike himself, "Come on, Bill, let's 'eave a arf brick at 'n." A very favourite attitude this of all untravelled men to peoplenarkedly different from themselves, which, among the better eduated, resolves itself into a lofty contempt for something exceedingly inferi, summed up in the delightful Gilbertian stanza—

> "For he might have been Rooshan,
> A French, or Turk, or Poshan
> Or perhaps It al an
> But in spite of all temptaons
> To belong to other natio
> He remains an Englman

In a spirit of amused contempt we for a ng time regarded Japan and all things Japanese. Japan was a sort of gallantrshow for our entertainment —

> Happy Japan
> Garden of glir,
> Flower and fa
> Flutter and flir

of the Mikado, the Geisha and San Toy. ater experience has taught us, however, that this is only one side (and that trestied) of the picture. Japan is a go ahead, practical nation, keen to adoptll the advantages of Western civilisation.

"Oh, east is east and west is west and ner the twain shall meet," sings Kipling. I, for my part, am inclined to questi this prophecy. In religion the enlightened Japanese and the cultured Englishn are not so very far apart; in morals and philosophy the best of both worldseet almost on common ground; in Art—English artists open their arms witenthusiasm to things Japanese. Insularity, prejudice, want of knowledge—thesre after all the only things that separate nation and nation. · Especially is thisue with regard to art. A little study, a little patience and we shall be rewed with a whole fairy-land of

delight. The Japanese colour print is something so new, so fresh, so vigorous, that to have conquered it and made it our own, for full understanding and enjoyment, is to feel something akin to a new lease of life. Then let us hasten to understand our colour print.

It is not so easy at first, because it defies every law in which we have been carefully brought up. The great aim of European artists for centuries has been so to treat a flat surface that it may not look flat any longer, that it will deceive the spectator into the idea that he is looking through a piece of glass into a hole in the wall. The owner of a new Academy picture likes to hang it on the wall with a feeling that he has a new window in his room, whence he can look straight away into a bit of Venice or Switzerland, and he likes to see a long way from its foreground to its middle distance, and from the middle distance to the vanishing greys of its horizon. Now the Japanese artist goes to work quite differently. Modelling and chiaroscuro are nothing at all to him. He does not for one moment wish to pretend that the paper he works on is anything else but flat. He takes no trouble to deceive the eye with contours. His first aim is to decorate that piece of paper beautifully, and next, without imitating the things he draws, to give them essential reality. For while he never imitates he is a wonderful realist. With marvellous energy and power he seizes the very essence of what he wishes to portray, grips it intensely and allows nothing of its vivid and life-like qualities to escape him.

To understand the art of Japan it is necessary to know something of Japan itself, "for Art is Art all over this quaint country; Art is almost air, for everybody breathes it."

It is six hundred years since Marco Polo, the discoverer, brought back to Venice and Genoa news of a wonderful country beyond China. He was the first and last European who ever held office under the Chinese Government, and it was from the Chinese he learned of the great islands to the eastward. "Zipangu," h reported, "is an island in th Eastern Sea very great in size the people of a white complexion of gentle behaviour—in religio idolators—and they have a king o their own. They have gold i great plenty; their king permit no exportation of it, and they wh have been to that country—an they are few—report the king house to be covered with gold (a churches are here with lead), gilde windows, and that they also hav many jewels." This news broug great excitement to the wild fre booters, the piratical Cecil Rhod

and Barney Barnatos of those days, and Spaniards, Portuguese, Dutch and English began to struggle rapidly towards the land where the "king's house was covered with gold." By the year 1540 two hosts of most Christian robbers were quickly advancing to this treasure island. The enterprising Pinto, the Portuguese, made common cause with some Japanese pirates he found marauding on the coast of China, and managed to be allowed to go home with his new-found friends in spite of an edict forbidding any strangers to land on the Japanese coast. For a little time there was important commercial intercourse with the Portuguese, and the missionary, Sir Francis Xavier, meeting with an encouraging reception, declared, "this nation is the delight of my soul." But alas, this foreign commerce began soon to take on a character which could not be by any means pleasing to a wise ruler of the Japanese people—it was a simple export of her metallic currency against the products of India and Europe; and, added to this, there is reason to fear that Japanese subjects were kidnapped and enslaved by the Portuguese and carried out of the country for sale elsewhere. Next, in the year 1587, the Mikado sent two commissioners to the head of the Jesu Church in Bonge, calling for categorical answers to the following question: Why do you and your associates use force in the promulgation of your creed Why do you invite my people to the destruction of the public temples and psecution of the native priesthood? Why do your traders kidnap my subjects an carry them off as slaves? These questions did not meet with satisfactory anwers—certainly none that satisfied the Emperor, and full of wrath he politely ut firmly requested the Jesuits to cease teaching Christianity and clear out of h realms.

"A Comic Print" *Hirokage*

The Jesuits appealed to their co-religioists in vain for any save moral support. *Twenty enthusiasts who insisted* opreaching *after* the Edict had been promulgated were executed, and the Emperoiby way of giving vent to a certain pugnacity in his Christian subjects, directed lge armies of them to the conquest of Corea, and mildly suggested that they migl settle there and convert the native inhabitants. Thus Taiko Sama, the great rd, solved the missionary problem of his day. After the year 1600 the Europns made few converts, and it can scarcely be wondered that antagonism to th foreign element practically closed the door of Japan. At the beginning of this ctury it was no better known than in the Middle Ages, and in the twenty-seconyear of the late Queen Victoria's reign, Sir Rutherford Alcock, Envoy Plenipottiary on his way to the Empire of Japan, reported it as "a cluster of isles on ie farthest verge of the horizon, apparently inhabited by a race grotesque nnd sage." *Japan was thus till less than* fifty years ago "a garden enclosed, a fountain aled" among nations. Her very isolation has given her a sturdiness, a vigourad individuality which have been reflected in her art.

This must partly be accounted for by thact that for many hundred years,

while the European nations were sunk in apathy with regard to all scenic natural beauty, so that even our poet Shakespeare, like a certain latter-day Impressionist, looked upon mountains with disgust, the whole Japanese people has been trained in a sort of ritual of nature-worship. "Japan is not a land where men need pray," says a sacred book, "for 'tis itself divine." Religion in its simplicity gives little encouragement to art, and every Japanese frankly worships "in temples not made with hands" without any of the apologetic attitude of our own mild semi-agnostics caught wandering in a country lane when everyone else is in church. Mountains are a great feature in this country—indeed, it is nothing more than a ridge of volcanic rocks rising from an ocean of stupendous depth. Every remarkable peak is considered sacred, and is the object of joyous pilgrimages in which religion and picnicing go hand in hand. The one most frequently met with in Art is Fuji San or Fusi-Yama. This "matchless mountain" is as much a part of the Japanese capital as is the dome of our own St. Paul's. It is not situated like our Snowdon, in an out-of the-way corner of the land, but rises among teeming millions, or, rather, the teeming millions have risen around it. Like the statue of Liberty at New York harbour, it is the first sight for all travellers and sailors returning to their native land. "Far out to sea," says Griffis, "long before land is descried, and from a land area of thirteen provinces the peerless cone is seen and loved." De Fon Blanquo writes —"If there is one sentiment universal amongst all Japanese, it is a deep and earnest reverence for their sacred mountain. It is their ideal of the beautiful in nature, and they never tire of admiring, glorifying and reproducing it." Hokusai, one of the greatest draughtsmen the world has ever seen was not content till he had published a book in which he depicted it under a hundred different aspects. Waterfalls, rivers and bridges are also frequent subjects. In sea-scapes the dark hue of the water is somewhat strange, but this is to be accounted for by the fact that the Japanese Gulf Stream which washes the greater part of the shores, is a wonderfully deep blue in sunshine; Japanese sailors call it the Black Current.

The student of Japanese prints will soon find evidences that the weather is a great factor of interest to the Japanese artist. He may also be surprised at the indications he finds there of intense heat and cold. But the land of the rising sun is a country of great climatic contrasts, for a temperature chart will show that, while part of it lies within the temperature band which includes Iceland and Canada, the southern portion is almost tropical. In summer the peasants are content with the unobtrusive garment in which they came into the world; in winter light but warm clothes padded with cottonwool are worn by everyone. In summer this people to whom shame of nakedness is happily unknown, combine the sweetness of doing nothing with the luxury of wearing nothing, in winter they crouch over charcoal fire braziers while the snow lies thick and undisturbed on trees and houses. We frequently find pictures of great wastes of mountain and plain where the little figures of men struggle painfully in desolate whiteness, and the round contours of snow-covered things are always wonderfully rendered.

Terrific rains are also a frequent *motif*. We see the young lady hastening to put up her umbrella; the convoy caught in a shower; the fury of hurtling rain and hail which hisses upon the ground. Sometimes, too, it is introduced solely as a background to human emotions. A distinguished general encounters a lovely lady who has taken shelter from a shower beneath some rose bushes. Under these circumstances it would be permissible to pretend that rain affected one's eyesight, but the warrior is truly chivalrous. In spite of rain and rank, his two swords, his bow and arrows, he raises his hat with a noble flourish high above his top-knot, while the blushing maiden acknowledges his courtesy by handing him a bunch of roses.

A STAGE GHOST THE SPIRIT OF THE WILLOW TREE

Kunsida

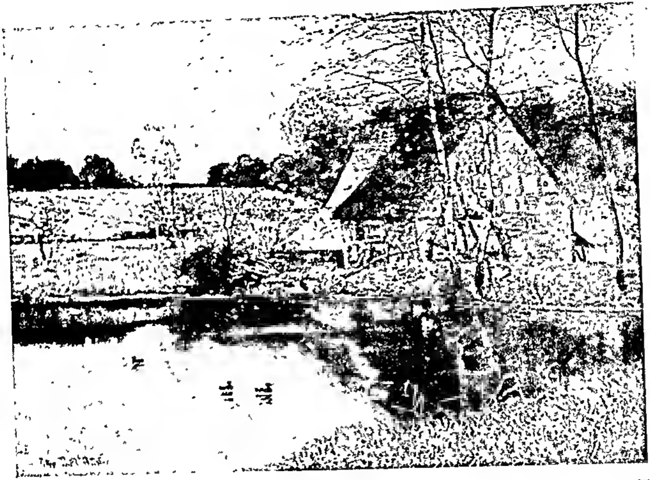
REMORSE

Yeisen

Illustrations to
"Japan and its Colour-Prints."

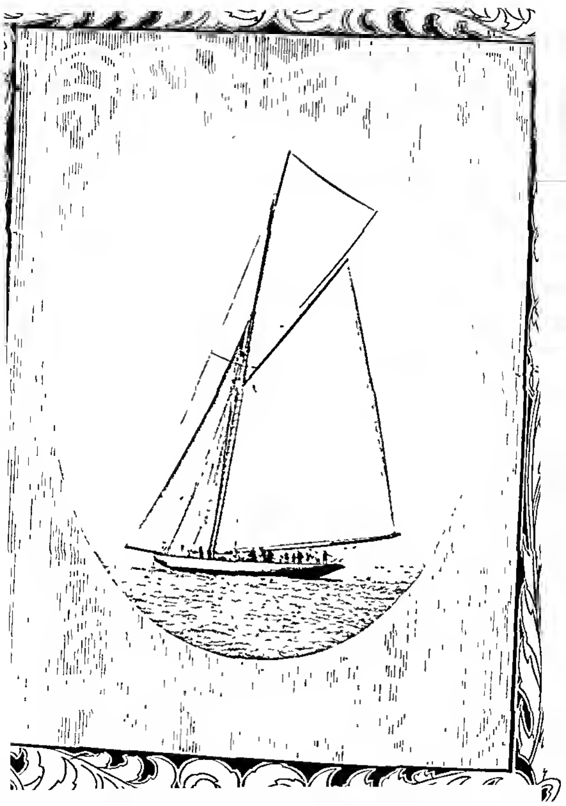
DER THE CHERRY BLOSSOMS *Kunisada*

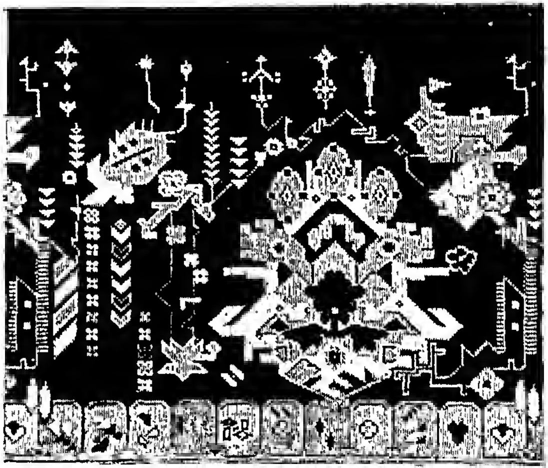
IN A PEONY GARDEN *Toyokuni*



THE OLD MILL.

Example of Work done with
Wheeler's Metrograph Screen.
Block by
J. Lowy, Vienna





A CARPET DESIGN

Three Colour Engraving by
M. Wolfe, Dayton, O.

Reproduced from the
Natural object

A PENNY SHORT

Three Colour Engraving by
M. Wolfe, Dayton, O.

orthochromatic negatives in their proper colour values, and will then make a print from each on any good gelatine paper, the effect will be there, right before his eyes. It can be seen at a glance where any little change could be made, by working over or re-etching in the final copper plate, to give the desired result. If the final negative could now be made from this paper print it would be much easier to *retain the colour values* that are in each ortho. negative, but paper expands and contracts unequally and this, therefore, cannot be done. For this reason transparencies must be made and from these the *final half* tone negatives.

It, therefore, follows that, given the first negatives in their true colour value, then the utmost skill of the operator is necessary to *retain* these values and either suppress or augment any particular colour that would have a tendency to improve the final result. As a guide to judge whether the first or ortho negatives are properly made it will be well to consider first what *proportion* of each colour will be required to make a true rendition of the subject. It is well understood that yellow, red and blue, if printed solid, one over the other in the order as given, will make black. See that your negatives have that quality in the darkest shades. Blue and yellow make green, therefore the yellow and blue negatives must have less, while the red will have more action in the green. The action in the blue negative is principally in the red and yellow. It will be seen by careful comparison with the original just how near these colour values compare. Then if these values are *retained* in the subsequent operations the value of the original will be obtained at a minimum of expense, which is the one great object from a financial standpoint.

It may be well to state further that the success in obtaining true ortho. negatives is not alone due to the method of bathing the plates for colour values, or even to colour filters. *It is very easy to spoil the ortho. effects by improper development.* From the beginning to the end there must be perfect harmony in all the operations, or failure will result.

Even after making the most perfect half-tone negatives the results can be spoiled in the etching. With the subject before him the etcher must consider well what parts of each plate must have more or less etching; then he must paint out and re-etch accordingly. If necessary, proofs in black can be pulled from the plates before the final etch. This is a part of the operations that necessitates just as careful study as the making of the ortho. negatives.

Three-Colour Printing.

Now comes the part that is of special interest to the printer. How many printers are there who have the right appreciation of the methods to adopt to make a perfect three-colour print. The number is comparatively small. Printers, as a rule, are slow to adopt new methods. It was the principal trouble in the early days of half-tone printing, when they thought no cut would give good results except wood cuts or reproductions of like character. But new methods must and will come, and the quicker the printer takes up the line of march to the front the quicker will he reap the reward that is sure to be at the end of any notable achievement.

I feel that I cannot emphasize my language sufficiently in my talk to the printers. I feel and know that the engravers are far ahead of them, and it will be found that it is a comparatively easy matter to get good blocks made, while a very difficult one to get them printed.

As I am not a printer I cannot describe the manner of making overlays, etc., but I can and will describe the general principles to adopt, and a good printer should do the rest.

First—The printer should have the original subject before him.

Second—Photographic proofs from the original ortho. negatives, if made and printed properly, will be of great advantage as showing the colour values that he must preserve in each plate.

Third—Proofs should be printed from each plate. The red and blue plates can be proofed in their respective colours, but, as the yellow is too light a colour to judge of properly, this plate should be proofed in black. It can now be seen just how it should be manipulated according to the following rule. Pale blues, pinks, crimsons and violets must be treated as the *high-lights* of the *picture*, while dark greens, browns, scarlets and full yellows *as the shadows.*

I am certain that printers do not have a correct estimation of the value of the proper treatment of the yellow plate; and thus it is that many an otherwise good three-colour print is utterly spoiled in the very beginning of the printing. *It may be well to state here that the ink from each colour must be dry enough* before the next is put on, so that it will not be absorbed or mix with it, nor so dry that it will not stick to it.

In the printing from the red block slightly different treatment will be required than from the yellow. Delicate blues, greens, pale yellows and whites are the high-lights of the picture, and must be treated as such.

The blue will be found much easier to print than either of the other two, for the reason that any mistake is at once apparent, and treatment can be given accordingly.

If the preceding notes prove a stimulant to the workers (both engravers and printers) in the three colour method of reproduction, to the advancement of this beautiful art, then I shall feel myself amply rewarded.

STONEHENGE

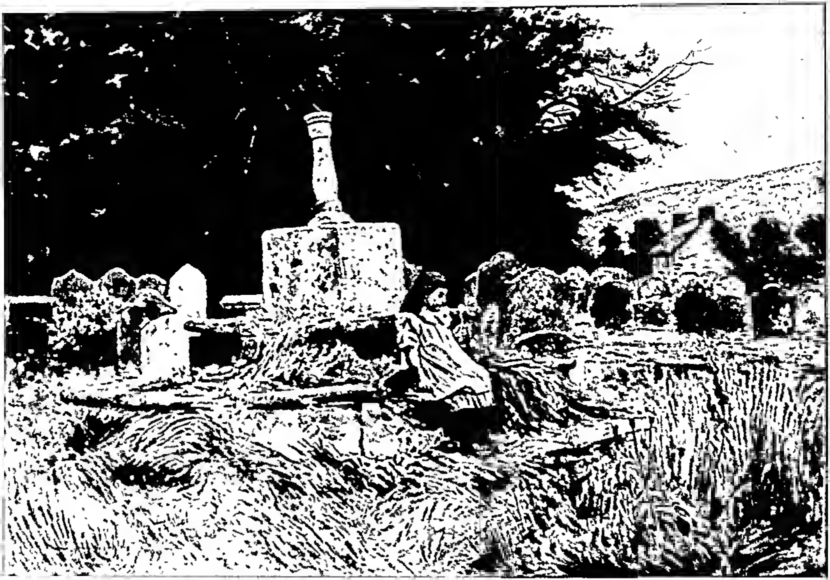
Block by
PAWSON & BRAILSFORD

Photo by
F. G. O. STUART

"WHEN THE SEA GIVES UP ITS DEAD"

Fine Etching by the Dragon's Blood Process by
BLATCHFORD BROS., Halifax

From an Original Pen and Ink Drawing by
M. J. BLATCHFORD



IN A BRECONSHIRE CHURCHYARD

Half Tone in Three Colours by
The Salvation Army Photo Engraving Dept.

Water Colour by
W. Marchant.

Direct Three-Colour Screen Negtives with Eos Emulsion.

By Burman Norton, Nottingham.

I've Found Pussy
Photo by
Jas J Mason

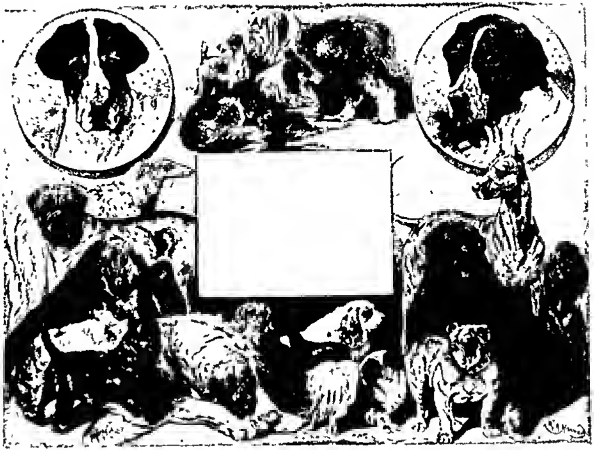
THREE COLOUR work now being a commercial success a few observations from an operator's standpoint might interest readers of the Year Book. What is wanted in three-colour process work is some method less complicated, with a saving of time. Making negatives and transparencies and screen negatives from the transparencies, making nine manipulations instead of three all means loss of delicate colour values.

Nevertheless there has been some exceptionally good colour work done by the indirect process, and very creditable to the experts involved. But if this procedure of using Eos Emulsion, and making colour screen negatives direct is of any benefit to the three-colour work, I shall be gratified at being of some use to fellow-operators in process work.

As Eos Emulsion R.P. is highly sensitive to all rays of the spectrum, especially the red, by *suitable screening you can absorb any colour* at will, and obtain in your screen negative the requisite gradations to give a blue printing plate of exquisite quality with very little fine etching required. Tanks are the most suitable filters, as you can make any modifications according to conditions, and original, etc. Picric acid, sat. solution, and bi-scarlet will give you any absorbing power at will, allowing exposures with a good light, medium stop, from five to ten minutes, according to reduction, etc.

Eos Emulsion A for the red printing plate is a sensitive film possessing the ideal of what is wanted, being least sensitive to red and highly sensitive to yellow and blue. By screening with picric acid, sat. sol., and acid green you will get a filter which will give a technically excellent red screen negative of just what is required for the red printing plate. With an exposure in a good light, medium stop, from two to five minutes, according to reduction, etc. Eos Emulsion without dye for the yellow screen negative—filter made up aniline violet blue shade, or a wet-plate, with tank filled with water—will give practically the same gradation in your screen negative, and a wet plate takes beating in being insensitive to yellow.

In making the screen negatives in my own practice, I take direct and strip, which is the best method, as there is a great loss of light if a mirror is used. With a prism it would be quite practical, in a good light, to do without stripping; but the latter has its advantages in getting all three on one piece of metal, where size allows, and etching together, which will ensure uniformity and balance in the finished plate. The Emulsion negatives strip like wet plate, leaving the glass just as easily, and there need be no fear of stretching or contracting, thus throwing out of register, if no heat is used, the film being allowed to dry on permanent support spontaneously. *The process is right, and you will get a good result every* time, as long as you have a good light. Three-colour work in a poor copying light is best left alone, as it is only a waste of good material and patience.



ALL SORTS AND CONDITIONS

Reproduced by Direct Process with "Eos" Emulsion, from a coloured poster, by BURNAM NORTON

By kind permission of STAFFORD & Co., Nottingham

be drawn in, being lost in the inevitable "screen tint," so that a good, fine etcher must be a "draughtsman" etcher. In truth, a first class fine etcher is on the same footing as a good wood engraver. He only *reproduces* other men's work; but he *can* make at least passable copy of it, and also appreciate its artistic merits. This latter qualification I think the more important.

Probably in the case we will suppose—a portrait—the face will be the only part requiring much more work, anyhow it will suit our purpose to consider it is so. I have a portrait in front of me now, and will attempt to give some idea of how it should be treated. Having put in the few solids (already mentioned) required in the hair, dress (which is very dark), and two very small blacks in the eyes, and given the cleaning bath, the background, hair—with the exception of some four or five high-lights—and the dress can be stopped out It now requires the eyebrows, the eyelids and the shadows immediately over them, the nostrils and their shadows, the line from the wing of the nose to the corner of the mouth, the under part of the under lip and some work on, round and under the ear put in. Some of this must be softened off by dragging the brush quickly away from the solid "stopping." But much of it, if drawn in properly, that is to say with judgment and taste, could with advantage be allowed to show slightly, thus giving a crisp and artistic effect which is too often sadly lacking in half tone portraiture. After this bath the eyes, including the shadows under them, the shadow side of the nose, face, the upper lip, the shadow of the lower one, and all the neck and some work on the forehead (shaded by the hair) should go in, leaving the high lights on the nose, the lower lip, the septum of the upper, the right cheek and the upper surface of the chin for the last etch.

The duration of the bath is the chief difficulty to the beginner, but, unfortunately, it is impossible to give any guidance on this in an article, as there are so many factors, all more or less varying in each job—for instance, the amount of contrast desired, the strength (depending to some extent on the thickness) of the resist, and the strength of the bath. This, when etching with perchloride of iron (and little else but copper is used nowadays), will vary with the temperature to an extent that, in the case of a badly-ventilated room which, from being very cold in the morning will be very hot by midday, needs reckoning with. One thing may be said—that to double, or nearly so, the preceding bath is, as a rule (but not invariably), correct. Thus, one minute, one and a half to two minutes, three and a half to four, and so on.

The most troublesome class of work to any but the most experienced craftsman is "vignetted" or "deep etched." By the latter I mean a job in which it is necessary to take out masses of white. Generally these jobs are the cause of much wasted time. The fine etcher puts in a considerable amount of labour in etching, and *then* has the whites cut or etched out, with the result that the work already done, and which has probably taken all the time that can be afforded, goes for little or nothing, and the best part of it is to do again. If, on the contrary, the whites are taken out first, the fine etcher can work with certainty, because there is no doubt as to what to retain (this hesitation as to what ought to come out is a prolific source of trouble and delay when working by the other method), and on getting to the edges he has no surrounding tint to deceive him in estimating the strength of the dots. It also makes it much easier to "soften off," as the brush can be used on the edges while etching, while they are better for printing, as, instead of the floor of the plate ending flush and coming within reach of the roller the double etching it gets between the outside points bevels it off, much to the benefit of the work and enhancement of the etcher's reputation.

Another "wrinkle" which is very useful where softness is required, is to "work out" the varnish or lac with a hog-hair brush, such as is used by oil painters. The flat shape is best, and two or three sizes should be kept. To use

them take a good brushful of lac and work it about on the border of the plate: or, better still, some portion of the plate already covered in, until tacky. Then, *holding the brush upright, dab it gently but rapidly, commencing against the* solid and work outwards, at the same time reducing the pressure till it leaves nothing behind. By this means a graduation is easily obtained that otherwise would be tedious and difficult to get, and the risk of bath marks avoided. But it will, of course, be understood that, if pushed too far, even this will give a mark.

As to colour work. Here the task of conveying instruction by the pen is harder still, as over and above the necessary experience in fine etching a thorough knowledge of colour, such as that possessed by a chromo-lithographer, is needed. To take the commonest and easiest form of chromo process—tricolour. Having first got your plates, carefully examine the original, and compare the strongest parts with impressions of a plate pulled in the inks to be used for printing, and put in very carefully any solids of a definite shape, such as lines, letters, etc. Any blacks in the copy must be painted in only in the blue. The red and yellow should be almost, but not quite, solid; or, in order to get black, the blue will have to be unduly strong, so causing loss of delicacy in the lighter tones of that colour. This done, hand over the plates to the "rough etcher" (so called from the manner in which he treats your work), with an earnest appeal to keep plenty of "colour" in them. Nine times out of ten he will ignore your request, but don't say anything: it's no good. You can't compete with the average rough etcher there.

On getting your plates back have a rough proof in colour made, and black impressions of each. These you will find of far greater service than the single-colour pulls that the pressman will provide, though these are useful. The beginner will also find it very helpful to have yellow-red and yellow-blue, and even, in the case of a subject in which warm greys and purples predominate, red-blue proofs. Supplied with these, he ought, by careful comparison of them with his original, to be able to proceed with some confidence.

In etching colours it will be found that a difference, which in black would be very pronounced, in yellow is hardly, or not at all, visible. In red it shows better, though to nothing like the same extent as in black, more especially in the shadows, but the strong blue necessary for this work approaches so near in strength and colour to black that it needs to be only slightly more emphatic.

It must be borne in mind, however, that the drawing which comes over strong colour must be more brilliant than if the underlying colour were weak—a solid red, for instance, will obscure a contrast that pink or yellow would leave very prominent. The same thing, of course, applies to the other two colours.

A fortunate thing about the trichromatic process is its comparative freedom from deep etching. When, however, it has to be done it should be the first thing seen to, as already advised, for black and white; in fact the need for doing so is greater.

In the case of a vignette I can only recommend the beginner to pass it on to someone more experienced, or less angelic, than himself. Failing this, don't attempt to "run out" the three colours to make them fit, as it is an impossibility, and means rainbow edges; and even if it were possible to avoid this it would still be undesirable, as the ending of three colours together would be much too strong to give any idea of a vignette. The only safe course is to compromise. If the background is grey use the blue only for the outside, keeping the needed amount of the other two colours to give the darker greys, etc., that will be immediately round the picture itself. If, however, the tone is on the buff or pink side it will be better to take the blue away, and for safety leave the yellow slightly larger than the red. This part of colour work, however, is so "tricky" that when it does occur it is, as previously mentioned, a question of compromise—and good taste.

Lately it is becoming a rather common practice to add a grey printing to three colour work. This may be very advantageous or otherwise, according to the way in which it is used. With the drawing put in vigorously—plenty of solids, the "stopping out" made to "jump," and a liberal disposition shown in cutting out whites—a decided improvement can be effected, and the too common defect of this process (flatness) considerably reduced. My own inclination, however, in using a fourth printing is to make it pink or light blue, according to the predominant tone of the original. By so doing the delicacy of tint that it is impossible to get from the intense colours is obtained, and a still greater improvement results. Another advantage of this light colour is that it gives much better flesh tints and greys than a grey which too frequently degrades them after they have been made by the three colours, whereas the pink or light blue gives them greater tenderness and transparency. This plate, like the grey, must be very boldly treated, but the deep-etching will be transferred to the plate it is supplementing.

As to other methods of chromo-process where the tri-colour process is usually more or less dispensed with—usually more—they vary so much in themselves and require such individual treatment, each one being worked out on its own merits, that any attempt at "coaching" would of necessity be a failure. The men who do this class of work have been taught by years of experience.

I may point out that where a black "key" is used with three, four, or five colours added, the latter are not required of the same intensity as when everything, even black, has to be made by the three so-called primaries, so that the etching has to be correspondingly vigorous. Another difficulty, met directly the former process scheme is abandoned, is that the colours vary both in tint and tone for each job. In other words, an automatic system has given place to individual treatment. The system can be to some extent formulated, but the individual method is a matter of personality modified by experience.

TENT PEGGING

Block by
LONDON STEREOTYPE WORKS LTD
Birmingham

Photo on National Dry Plate by
F G O STUART

STUDY OF ITALIAN GIRL'S HEAD

Reproduced in three colours by
"QUEENSLANDER" ENGRAVING CO

From a Painting in Oils by
J. MUNTZ

Experience, or Superstition?

By H. Hands, Jubbulpore, E.I.

SPINNING WOOL YARN

Block by W. & G. BAIRD — Photo by J. WELCH

SOONER or later, the beginner, who picks up his knowledge from books or from instructors, is bound, in the light of his own experience, to wonder at the divergences which exhibit themselves between the theory of his teaching and the facts of his practice. Of course I refer to the man who, after getting through with his "beginnings," wants to know the "whys" and "wherefores" of what he has been taught, and forages himself for that knowledge which always comes to the assiduous worker. There is, of course, a large class that accepts all they are taught as beyond question, and who never dream of putting it to test. It is among this class that what I here called superstitions flourish and are perpetuated. It often happens that, in the presence of what a worker thinks unmistakable conditions, a failure occurs, and without making any tests to verify his deductions, he assumes that the failure is the necessary outcome of the conditions he has observed, while it may be that the cause of failure is independent of them, and altogether the result of a condition or conditions that have escaped his notice. If he happen to be a known worker with some reputation, and he communicates his opinion to others, it is accepted as fact. It may, or may not, have detrimental effects upon future practice. It *may* certainly tend to hamper other workers. A specimen of harmless superstitions is found in the direction to *first* dissolve the metol, when making up this developer, before adding other ingredients. As a test I weighed out metol, hydroquinone, sodas, etc., and dissolved them at one operation in the water, without finding the slightest appreciable difference in the working of the developer. We are told that overheating a plate coated with albumen results in insolubility of the film. I accepted this as fact for years. One day, while at work on a block order, I fell to day dreaming (all discoverers are affected with this tendency)—the Penroses had become millionaires, Mr. Gamble had stepped into their shoes in the business, and had sent for me to take the place hitherto filled by his excellent self, when—"bang went saxpence" in the shape of the glass chimney of the lamp, over which I was whirling a zinc plate. It had got so hot as to become detached from the pneumatic holder of the whirler, and was some time before it could be handled. An ever-present spirit of inquiry prompted me to ink it up, with the result that it developed as though nothing untoward had happened. I looked upon this as another superstition knocked on the head. I read everythere that to "cut" the dots of an H.T. negative a *weak* solution of "Farmer" reducer should be used. Now I had often noticed in ordinary negative making that a *strong* solution would attack and destroy faint shadow detail some time before affecting the denser deposits. Now, after fixing, I soak a "screen" negative in fresh hypo solution for a couple of minutes; then plunge it into a very strong solution of ferricyanide of potash, and then immediately into water, keeping it moving. Result—a magic disappearance of the

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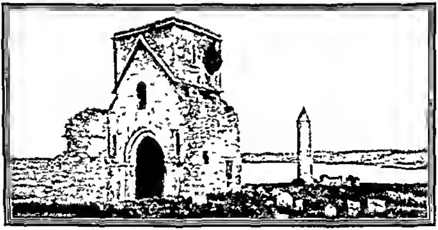

Devenish Abbey, Round Tower and Lough Erne

Block by
W. & G. Baird.

Photo by
G. Walsh

LE BILLET DE LOGEMENT

After L. Girardet

Example of untouched tri colour work
(no retouching; local or fine etching)
By the direct dry plate process,
POLYTECHNIC SCHOOL OF PHOTOGRAPHY

By permission of
MESSRS. GOUPIL & CO., Paris

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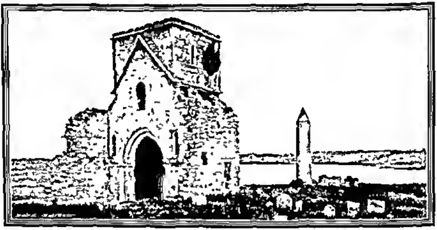


DEVENISH ABBEY, ROUND TOWER AND LOUGH ERNE

Block by
W. & G. BAIRD.

Photo by
G. WALSH

LE BILLET DE LOGEMENT

After L. Guardet

Example of untouched tri-colour work
(no retouching, local or fine etching)
By the direct dry plate process,
POLYTECHNIC SCHOOL OF PHOTOGRAPHY

By permission of
MESSRS. GOUPIL & Co., Paris

Maxwell—the Master Man.

A Study in Two Parts.

By Howard Farmer,

Director of the Polytechnic School of Photography

PART I.

THE TRYSTING PLACE

Photo by
CH SCOLIK

WHEN Clerk Maxwell showed that all the colours of nature, could be matched in hue, by mixtures of three spectrum colours, and in his celebrated curves gave the exact proportions required, the whole scientific world applauded and recognised the master hand.

Now, suppose, being a keen and practical inventor, you are thinking out the subject of tricolour photographs and whilst looking for an inspiration, Maxwell's work suddenly comes to your notice. Would you not press your hands to your head and, with all the mental and inventive powers at your disposal, look at those curves (diagram 1) and those three simple colours (diagram 1), with their manifold possibilities? Would you not exclaim, "I have it! I have it? My negatives must photograph the rays in the proportions of those curves for reproduction by the three colours and the thing is—eh, what?—perfect theoretically; but, vanity of human desires, spectrum colours are useless. Yes, triumph of cuteness, use transparent dye colours; combine in practice Maxwell's curves and three bright, transparent colours. Quick—what is the best test subject—the spectrum? Yes, barring a little dilution with white, it is correct. Hurrah! the thing is done? The thing is done?"

Maxwell—curve records when taking the negatives, and three simple (with a go-as-you-please interpretation of the word simple) colours for the reproductions. How scientifically complete it seems and supported on the solid rock of the work of the Master Man?

Under the name of the "Ives' principle" this system has overrun the English-speaking map—up and down—right and left—like the acid under the strokes of an etcher's brush; in article, lecture, scientific paper and text book; and no wonder, considering its plausibility, that it has caught on with such amazing virility.

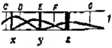
No definite information, however, being given to prepare filters and plates so that they are in accordance with it, you will, with patient labour and a photospectroscope, have to make these adjustments yourself before proceeding to apply the system in practice; and then. Colours wrong, and degraded out of all recognition, especially the greens; this, briefly, is the general result.

After a few or many days of failures you will probably suspect there is something amiss with the "Ives principle" and proceed with a more obvious (the science being imperfect) method of arriving at the most accurate results—that is, adjust your colour filters by putting up and actually reproducing, by the system of trial and error, a colour chart, containing tints and shades and whites and greys, as well as the plain colours. Mr. Guy Symmons has done this for our school at the Polytechnic, using both a colour chart in oils and a colour chart in water colours. He has done it with a thoroughness which is well illustrated by the example accompanying this article, not a specimen of finished tricolour work, but one amongst many similar untouched reproductions, and forming, I believe, the highest standard of work reached in this country without finishing or fine etching.

These filters, once obtained, can be registered by photographing the spectrum on the plates with which they are used. By the same means they can be compared with other filters and when this is done and their records are compared with those required by the "Ives principle" (diagram 1), it is found there is no "Ives principle" concerned, and they divide the spectrum into three parts (diagram 5). You will now wish to compare these with other workers' filters; and on obtaining the photographed spectrum records of Mr. Ives' filters (diagram 2) or of Mr. Sanger Shepherd's filters (diagram 3) or of Carbutt filters (diagram 4), there is again no "Ives' principle" discoverable—but three substantially isolated bands similar to your own (diagram 5). It is curious to note that neither the talented inventor of the "Ives' principle" nor Mr. Sanger Shepherd seems to attach much importance to it in practical work, since the filters they issue, judging by those we have been able to test, have no connection with it.

DIAGRAMMATIC ILLUSTRATION OF SPECTRUM RECORDS FOR TRICOLOUR REPRODUCTIONS.

No 1 { The Maxwell curves, and
The Maxwell spectrum primaries x, y, z



No 2 { Spectrum records obtained with a set of Ives filters (three other sets giving similar records)

No 3 Spectrum records with a set of Sanger Shepherd filters

No 4 { Spectrum records with a set of Carbutt filters These were found very inefficient owing to the indiscriminate transmission of ultra-violet rays

No 5 Spectrum records with a set of Polytechnic filters

Proceeding yet further with your inquiry, you refer to the writings of Ducos du Hauron and other Continental pioneers — Prof. Vogel, Baron Hubl, etc., who working on different lines, have published the results of

their researches, and you find that in their filters also no "Ives' principle" is concerned; and they also give as spectrum records three isolated bands similar to or the same as your own.

What, then, is the meaning of this mass of practical evidence, which, whilst in every direction confirming its own results, is apparently against the teaching of science?

Part II.

When—the year following the publication of his colour curves—Professor Maxwell, from the lecture-table of the great Faraday, also explained and demonstrated a complete system for reproducing the colours of natural objects (not the spectrum) by means of photography, the technics of the art were not sufficiently advanced for his audience to practically utilize his teaching or to appreciate it at its true value. Only a brief report of the lecture was recorded and it remained neglected and forgotten or, worse, referred to as rubbish.

They failed this time to recognise the Master hand.

Now, being anxious to arrive at the truth, although it may not agree with our previous convictions, suppose we study the brief report of Prof. Maxwell's system of photography with the same keenness that you did his spectrum work, word for word and in every possible aspect of meaning, with a view to ascertain the optical essentials, for surely that report must have passed his scrutiny; and, if so, so far as it goes, will correctly represent his views. The first thing we notice is that he entirely dropped the use of his spectrum colours and employed solutions of coloured salts. He also entirely discarded his spectrum curves and used the same solutions, both as filters when taking his negatives and for his reproductions. We are further told that these solutions of the coloured salts are to be adjusted in strength to match his three spectrum primary colours and for this purpose a piece of apparatus known as Maxwell's *Colour box is required, which being rigged up, what a revelation of the properties of colour relating to tricolour work it proves to be.

Below are given determinations with the Colour box of quantities which fulfil the required conditions.

No. 1

Cupric sulphate (pure cryst.)	120 grains
Ammonia 880	120 minims
Water (distilled)	4 ounces

Used in a cell of quarter-inch section

No. 2

Cupric chloride (pure cryst.)	5760 grains
Water (distilled)	20 ounces

Used in a cell of one inch section

No. 3

Ferric sulphocyanide (pure cryst.), stock solution	240 grains
Water (distilled)	20 ounces

The last named diluted when required as follows:—

Stock solution (No. 3)	360 minims
Water (distilled)	4 ounces

and used in a cell of quarter inch section

When we have made this adjustment of the three solutions we shall have a mind to compare them with the filters we have found (with the aid of our colour charts) to be the most accurate: and lo! on making the comparison we find his

* The Colour box may be roughly described as a double spectroscope, one being reversed—it enables any and every proportion of rays to be mixed together and the colour formed compared with the pure spectrum colours

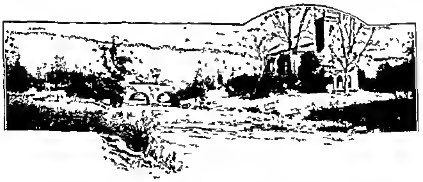
In my own practice I have used 2 grains pyro to ounce, the usual amount of soda and sulphite and no bromide, with a factor of 9. When using a metol hydroquinone developer (no bromide and 1 metol to 2 hydroquinone), I found the factor to be about 8. With metol only the factor would probably be about 20.

The time of development being thus ascertained, the plate is put into the dish in darkness, the developer poured on and covered over, and at the end of the calculated time the plate is taken out and fixed. To get more contrast use a higher factor, for less contrast a lower one.

It has been usually presumed that when using the same kind of plate for the three negatives of colour photography, the time of development should be the same with all three in order to get equal steepness of gradation. I have always followed this plan in practice and have not noticed it leading to very serious error. But Mr. Chapman Jones has found that if a plate exposed through the red screen is developed for the same time as one exposed through the blue screen, it will have a steeper range of gradation.

Some trials of my own indicated the same result. It therefore seems probable that to get the most perfect results on all the tones, the red negative should receive a slightly shorter development than the green, and the green a slightly shorter development than the blue. Naturally, this cannot be done if all three exposures are on one plate. Supposing the negatives are separate, the desired result might be attained by altering the factors, giving the red, say, 8 times appearance, the green 9 times, and the blue 10 times. It is, however, a matter for further trial.

There are two strong points about this method. The first is that it makes correct allowance for the density-giving capacity of the plate; a "density-giving" plate attaining the same steepness of gradation with a factor of 9 as a "soft" plate, each being developed by its own slip. The second point is that the accuracy of the standard exposure on the slips is, curiously enough, independent of the varying standards of light which different makers may use. If two different experts tested a plate with the same developer but different lights, one making it, say, H. & D. 50, and the other H. & D. 100, and each were to expose it to four times the inertia *with his own light*, both would impress their slips with identical light impressions.



Cromford Church and Bridge

Block by
C. W. Harness

Photo by
H. Pegg

AN IMPROMPTU SPEECH.

Specimen of Three-Colour Work
Printed by G. Delgado,
17 & 18, Paradise Street,

Blocks supplied by
The Electro Tint Engraving Company.

Focussing with the Modern Anastigmat.

By William Taylor, Leicester.

Who Said Rats?

Block by Bourne & Co Photo by Byrne & Co

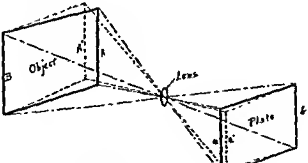
MODERN anastigmats, of which the Cooke lens is an example, call for much greater care in focussing than did lenses of the older types. Not that the older lenses would give good results with less care; on the contrary, no amount of care could produce from them the results which a good anastigmat can yield.

Care, however, is necessary to get these results, and much more care than is frequently given to the matter by those who have been accustomed to what we may call the older lenses.

These older lenses differ from the modern ones chiefly in their very different capacity for producing fine definition at the margin and corners of the plate. They failed in this from two distinct causes. Their images, even of flat surfaces, were invariably dished somewhat like a saucer, and obviously could not be focussed all over at once upon a flat plate or focussing screen. If the centre of the image were in focus, the margins were out of focus, and vice versa.

But this curvature of image was accompanied by the more serious defect of astigmatism, which, though absent at the centre of the plate, displayed itself in growing intensity toward the margins, and made it impossible to secure sharp definition there, except by the use of small stops in the lens.

The modern anastigmat, however, with its large aperture, produces flat images of flat objects, is free from astigmatism and, when proper care is used to get this flat image coincident with the surface of the focussing screen or plate, definition may be secured equally fine practically from centre to circumference of the image.



—Fig 1—

S

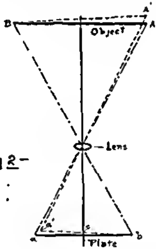
To get this image coincident with the plate requires, however, considerable nicety of adjustment of the three elements:—Object, lens and focussing screen.

Let us further consider the matter and for brevity use the term "plate" as meaning the plane of the plate or focussing screen with which we want the plane of the image accurately to coincide. We shall consider only the case of flat objects, such as are "copied" in the ordinary process worker's camera; and, omitting for the time any thought of the reversing mirror or prism, fig. 1 represents for us in perspective the three elements.—Object, lens and "plate."

Now, in the first place, we may observe that, not merely for the sake of definition, but also to secure freedom from distortion, the object must be accurately parallel to the plate. Suppose, for example, that the object is moved, as shown by the dotted outline, so that its side A is at A', while B remains unmoved. Then the image on the plate will have its side *b* unaltered, but *a* will be shortened as at *a'*; and thus, from a rectangular object, we get an image which is not rectangular, but distorted.

For many purposes, so far as distortion is concerned, sufficient accuracy in setting the object parallel to the plate is easily obtained, if, indeed, the camera

-Fig 2-



maker has not already provided it. But for the copying of maps and other plans, from which every error must be eliminated, nothing less than the most careful testing of the apparatus by direct measurement can be deemed sufficient.

We are dealing, however, with definition rather than with distortion, and fig. 2 shows in plan the effect upon definition of the movement of the object from A to A', already shown in fig. 1. Here it will be seen that the image *a'*—*b* does not coincide with the plate *a*—*b* and cannot be focussed sharply upon it all over at one time: *b* is in focus, but *a'* is out of focus; and if *a'* were focussed, *b* would be correspondingly sacrificed.

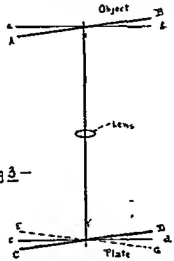
It is common in such a case to focus at the centre C, thus also making an average or mean focus for the margins *a* and *b* and to improve their sharpness, if necessary, by stopping down the lens. This, however, is clearly the wrong remedy, although it is too commonly the resort of even experienced operators who have grown familiar with it in using the older types of lens.

If the camera be set for copying equal size, so that the object and plate are equally distant from the lens, then any small displacement of the object B—A, fig. 2, as to the position B—A', will cause an exactly equal displacement of the image.

No operator would like to be told that his photographs were anywhere, say an eighth of an inch, out of focus; and yet the defect illustrated in fig. 2 is a very common one and $\frac{1}{8}$ of an inch is often much exceeded.

But not only must the object and plate be parallel, the axis of the lens must be truly vertical to the plane of the plate. In fig. 3 the thick lines *A—B*, C—D, representing respectively the object and plate, are shown parallel to one another, but the lens axis *x—y* is not square to them.

Had the object and plate been square to the lens axis in the positions shown by the thinner lines *a—b*, *c—d*, then the image of the object would, of course, have been in accurate coincidence and focus all over the plate. But B has been moved from the position *b*, let us say, $\frac{1}{8}$ of an inch. Assume that the camera is arranged for copying equal size, then those who are acquainted with elementary optics will know that the image of the point B will have moved to E, which is $\frac{1}{4}$ of an inch from C; and the whole image object A B will lie along the dotted line E G, which is very far removed from coincidence with the plate C D.



-Fig 3-

It is evident that in such a case the placing of the lens axis squarely to the plate and object is of vital importance in securing the fine definition which the modern anastigmat is capable of giving. And nothing short of extreme accuracy is sufficient for this purpose.

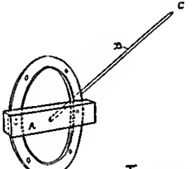
A lens axis is, of course, not a tangible thing. It exists only in imagination and not as a line to which the photographer can apply a square so as to set it squarely to the plate. He usually relies, therefore, upon the accuracy of the optician's work in setting the axis of the lens squarely to the flange which unites it to the camera. Speaking for my own firm, with a knowledge of the methods employed in adjusting Cooke lenses, I know that, unless a Cooke lens has been subsequently damaged, this matter can be relied on absolutely. It is probably so with other anastigmats, and all that is necessary in adjusting the camera, if we take this for granted, is to set the board, to which the lens flange is screwed, truly parallel to the object and to the plate.

This is best done after the flange is fixed to the board, and by means of the engineer's scribing block, a substitute for which may be made by taking any convenient piece of wood, as A, fig. 4, with a truly flat face, which can be applied to the lens flange in the manner shown. Fixed in A is a rod or wire B,

sufficiently rigid to resist bending appreciably by its own weight, whose point C can reach to one corner of the plate. The camera must then be racked until the rod just touches the focussing screen. By applying this gauge with due care to the four corners of the focussing screen in turn, it is easy to see if the screen is parallel to the face of the flange.

In order to set the object parallel to the plate and when, as in the accompanying illustrations, no reversing appliance intervenes, the same gauge may be used as in fig. 4, but with its other face A set against the face of the flange. The rod B will then project outward from the camera, and may be applied to the surface of the object or copy board at its four corners, and its accuracy of setting thus determined.

In dealing with a large camera for which a gauge of this sort would be too heavy or clumsy to handle successfully, it is convenient to set the plate and object and, if necessary, the lens board, accurately plumb, using a fine cotton thread weighted as a plumb line, and, at the same time, fine threads may be stretched across the room in one horizontal plane, being supported by convenient objects, and set, one of them close to and parallel with the object, another similarly parallel to the plate, and if required, a third parallel to the lens board or flange.



—Fig 4—

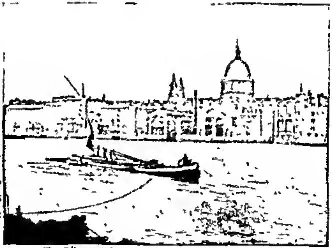
When these adjustments are complete and satisfactory, but not before, the threads may be examined to see if they themselves are parallel. Of course, wooden or other straight edges may be employed for this purpose, but the fine threads will probably be longer, less costly, and more reliably straight.

Unfortunately the ordinary arrangement of reversing prism used for process work, which requires the object and plate to be at right angles to one another and not parallel, makes it somewhat more difficult to determine the requisite precision of setting.

Without doubt, from this point of view, the fixing of the prism to the camera, with the lens outside the prism, is better than to fix the prism upon the outer end of the lens, because, with this latter arrangement, it is difficult to keep the face of the prism set always truly parallel to the object and any such error has all the effect of corresponding displacement of the object.

With any arrangement of prism, however, assuming that the prism and its mounting are accurately made, if the flange or front board of the camera has been set parallel with the plate by means of the gauge shown in fig. 4, it is convenient to use the same gauge for setting the object parallel with the prism. This may be done by setting the face A of the gauge against the outer face of the prism box and offering the point C in turn to the four corners of the object, in the manner already described.

LONDON STREET SCENE



THE THAMES.

Photographs
Design and Blocks by
CLARKE ENGRAVING CO., LTD.,
London and Birmingham

The Silver Bath.

By H. Jenkins, Chicago.
Author of "Manual of Photo-Engraving

A MANDOLINE SOLO

Block by GRAPHIC ENGRAVING CO. Photo by BYRNE & CO.

THE beginner in process work, as a rule, looks upon the silver bath as some mysterious thing possessing elements of perversity that are sure to prove pitfalls or stumbling-blocks in his career. The older worker, also, often finds difficulties with the bath that are due to lack of care in studying its nature, the means necessary to keep it in good condition and the causes for impairment of its action. There is no reason why the silver solution should present the troubles that are ascribed to it, if it receives the intelligent attention that the careful workman will give to it. Let us briefly outline the methods for preparing the bath and some of the precautions to be taken in its use.

Preparation of the Bath.

A solution is made of pure silver nitrate and water—preferably distilled or pure rain water—the strength being brought to about 45 by the hydrometer. After filtering into a *clean* bottle through absorbent cotton placed in a *clean* funnel, the bath is poured into its receptacle, which has previously been thoroughly washed. It is then ready for iodizing. By this is meant the formation of silver iodide in the solution, the purpose being to prevent the dissolving of the salts out of the collodion on the plates into the bath, which would otherwise occur, leaving a thin, weak film. Iodizing can he done by adding to the silver solution some iodide, as that of potassium, but it is preferable to insert a large plate coated with the collodion that is to be used, letting it remain until its salts have been taken up in the solution. This operation should be repeated until the plates, after a few minutes' immersion, come from the bath with a rich creamy looking film. Then, in order that the lines may be clear on the negatives, C. P. nitric acid should be added drop by drop until the bath is sufficiently acidified to cause blue litmus to turn red after a short immersion in it. The addition of too much acid must be avoided, as an excess will cause weak images on the negatives.

The reaction in iodizing the bath consists in an exchange of the silver and the other metallic atoms. The silver unites with the iodine, while the other metal takes up with the nitrogen and oxygen of the silver nitrate. There is thus formed a nitrate of that metal and iodide of silver.

Being in a clean condition, iodized and acidified, the bath is ready for use, and we may also emphasize for *care*.

Care of the Bath.

Keep it absolutely clean by frequent filtering through cotton, avoiding the use of bottles or funnels that have any trace of dirt or chemicals about them.

Keep it isolated from the fumes or chance spattering of other chemicals. Keep it covered when not dipping plates. See that the plates you immerse are clean and that your collodion is well filtered. Keep its strength up by adding fresh acidified silver solution as required. See that the hands are free from dirt and chemicals when liable to come into contact with the bath.

When the bath becomes charged with alcohol, broad wavy marks running in the direction of the dip will appear in the film on the negatives. This calls for boiling down in a porcelain dish. Have the dish clean, place it on a gas stove and pour the bath into it. Apply the heat until the odour of alcohol has entirely disappeared from the steam. Then bring the bath to strength by adding clean water or silver solution, as the case may require. Also add a few drops of acid if necessary.

When the films are covered with a multitude of fine transparent holes, the bath has become charged with an excess of iodides. In that case, place some clean water in the porcelain dish, and pour the bath into it in a fine stream. The excess of iodide will be precipitated. Then boil the bath until it again has the required strength.

To remove organic matter and dirt from the bath, pour it into a large, clean, clear glass bottle, put into it some bicarbonate of soda to neutralize the acidity, and set in the sun for several days. The silver nitrate combines with the organic matter, forming insoluble compounds which are precipitated and can be removed by filtering. Bring to desired degree of strength and re-acidify.

Attend to these three points—purity of constituents, cleanliness and attention to the daily condition of the solution, and you will have a minimum of trouble with your bath.

"Where Breaks the Wave"

Block by
Half Tone Engraving Co Ltd

Photo by
C E Collings

The Three-Colour Process.

By Prof. Dr. G. Aarland, Berlin.

A Defender of the Empire

ch by Einlander & Co — Photo by Byrne & Co

HOWEVER great the improvements made in the three-colour process, much remains yet to be done to perfect the same.

If one compares a series of three-colour prints, the *monotony of the colours* is really surprising. As a German artist expressed himself, one picture looks like another, colours repeat themselves over and over again, and the result is a dead monotony.

What is the cause? Many circumstances are to blame for it—the filters, the printing inks, the negatives, the etching, printing, etc. There are very few filters in existence which will comply with the scientific requirements which are the basis for this kind of work, and if they do they only do it conditionally.

Many are preparing their own filters, and rest content in the belief that it is sufficient if their filters are red, green and violet! Only compare the many contradictory publications and formulæ dealing with this theme.

But even given good filters—absolutely perfect filters do not exist—and further suppose that the three complementary images are properly obtained, and from the half-tone negatives a perfect transfer effected on the metal, there is a possibility of totally spoiling the printing plates in the etching bath, and that is too often the case.

Very few know how to etch three-colour plates properly. All the work is empiric, and how many understand what tone values are required to obtain a given colour? Coloured pictures are produced which do not lack a certain elegance and technical perfection, but are deficient in soul.

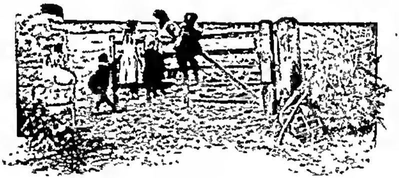
Greater facilities and surer working methods should be created by a work entitled "Systematic Three-Colour Work," by Prof. Berthold and myself, which we hope to publish in the course of this year. This work is the result of years of experience and laborious research.

After the plates have been etched in a satisfactory manner, we come to the printing—again a new difficulty. Only one firm is known to me which prepares printing inks for three-colour work on scientific principles, and this is A. B. Fleming & Co., in Edinburgh and London. On the whole, printing inks are chosen most injudiciously. And with such working modes do we expect perfect colour prints? It stands to reason that the result must be very meagre.

For a really sure execution of the three-colour process, whatever the process employed may be, we *do not possess the fundamental scientific researches.* So long as these are not made, all three-colour work will be tainted with a peculiar unfinishedness and uncertainty.

But the researches referred to are in progress. Of course they are very difficult and cost a good deal of time, in fact it will require years until practical results are arrived at. Then, however, we can expect the three colour process to reach the highest stage of perfection.

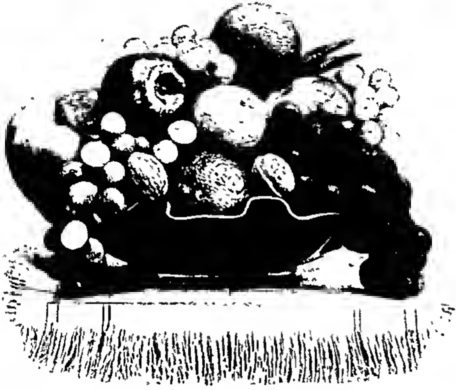
Until then we must be satisfied with what we can get with the appliances at our disposal, and that is, as already mentioned at the beginning, fairly respectable. The general public enjoys the coloured illustrations and does not see the short comings, which are only observed by the expert or the artist.



Block by
GRAPHIC ENGRAVING CO

HOLD TIGHT

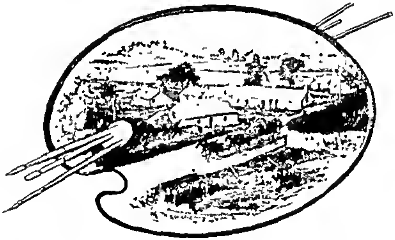
Photo by
H. C. LEAT



CHROMOTYPE DIRECT FROM NATURE

Blocks by
Joh. Hamböck,
Inh. E. Muhlthaler Munich

part remains unclouded. will depend on the plate, and therefore be outside the control of the photographer. If the exposure is longer than this, a possibility of developing to a greater density is obtained, but it is necessary to keep the transparent parts unfogged by the manner of development. It is under these circumstances that the skill of the photographer is specially shown, and that uniformity of treatment throughout is desirable in order to continue to get the best results, when the conditions yielding them have been worked out.



A HIGHLAND CLACHAN

Block by
TAILBY & PRICE

Photo by
JAS. McLEOD

THE
WILLOW
PATTERN
PLATE.

Reproduced Direct from
the Plate by
The Grosvenor Engraving Co.

Some Notes about Three-Colour Work with Collodion Emulsion.

By Henry O. Klein.

CHILDREN OF THE ORIENT

Photo by Ernst & Co

THE reason why collodion emulsion gives better results in trichromatic work than the panchromatic or orthochromatic dry plate is to be found in the comparative absence of the screening effect, which is due to the eager absorption of the colouring matter by the gelatine when colour-sensitized.

Our aim is to colour-sensitize the bromide of silver, which, however, cannot be done without colouring the gelatine or collodion film. The latter will act as a light filter and will weaken—and in many cases transform—the absorption bands of the plate.

Gelatine films, however thin, quickly absorb the coloured solutions and assume considerable density in the short period of a few minutes' sensitizing, whilst collodion emulsion is almost free from this drawback, which in the preparation of the plates for three-colour work plays a very important rôle.

The first to note this interesting phenomenon was Baron Hübl, whose work, "Die Dreifarbenphotographie," published some years ago, still stands amongst the most treasured works on heliochromy. Its precision and scientific accuracy, coupled with its exemplary truthfulness and simple language, commend it to the student and practical man alike.

Collodion emulsion is easily sensitized for certain colours; and as light filters measured to suit the sensitiveness of isochromatic emulsion are commercially obtainable (I refer to Dr. E. Albert's Collodion Emulsion Eos and suitable light filters sold by Penrose & Co.), we can expect to see in future more three-colour work which can claim to be free from the creative influence of the now important fine etcher, and of certain distinguishing marks of the three-colour process, more offending to the artistic public than to the craftsmao, who looks upon them as a necessary evil. Another important point I should like to mention is the position of the light filter, which, if quite close to the plate, will prove most satisfactory. Although the ideal method of work would lie in the application of coloured lights, with which the original could be illuminated, lights as accurately measured to suit the absorption bands of the plate as those which pass our light filters we now employ, for certain reasons, of which the fading of colour and subsequent alteration of the absorption bands caused by the intense illumination of the electric arc is the most prominent, we are still compelled to stick to our old methods of using the filters in front or at the back of the lens or in front of the

On Retouching.

By W. H. Fairbairns.

PLAYING "LONDON"

Photo by H C LEAT.

PERHAPS the correctness of the title of this article may be questioned, but the term "retouching," although somewhat absurd, is now so universal, is certainly more euphonious than "faking," and on the whole expresses what is intended, that it may perhaps be allowed to pass. What is now wished is to discuss not the retouching of portraits, but the wisdom and the justifiability of adding handwork to a photograph, block or other reproduction of a painting, and more particularly the painting of an old master. In the days of hand engraving the question did not arise. The engraver had before him the painter's work, and had to give an interpretation of the picture in his own style. This, of course, was done in many instances with the greatest success. Sir John Millais expressed very emphatically his appreciation of the work of his engravers, and it has been said that the early and rapid success of this great painter was considerably helped by the beautiful series of prints of his pictures published by Messrs. Graves. The print, then, was accepted not as a reproduction of the artist's handwork, but as an interpretation of his picture, and success was gauged not so much on a question of technique—beautiful as this very often was—but as to how near the engraver had caught the spirit of the original.

To-day the conditions are entirely different. Photography has revolutionized things. It is now possible to show in any reproduction the actual hand of the master. Some publishers claim this as one of the merits of their process. It is a merit, and the works so presented are of the greatest value to the art student and connoisseur. But may it not be carried too far? Let it be remembered that we are reproducing in monotint a picture painted in colours, and however well the values may be represented, however accurately the drawing may be copied, it is clear that we have lost something—something, too, upon which the artist depended to convey his meaning. Take Turner, for instance. Modern methods have reproduced his works in an altogether pleasing manner. There is a softness which was largely missing in the engravings. But in trying to be faithful to the master's hand it must be acknowledged that at times the spirit has been dimmed. We are not far wrong; but we might be almost right. Anything, therefore, that may help to bring us nearer to what the painter intended to convey should be welcomed; and if a little handwork—only, however, to be added by a skilful worker—does help us, then it ought to be introduced. As we value an interpretation into our language of Homer or Dante or Goethe which not only gives us the words accurately, but also the spirit of the original, so we may value the same qualities in reproductions of Raphael, Velasquez, or Turner.

Some translations give us accurate words with truthful spirit. In pictures this can only be done in colour, and satisfactory colour work is not very far away.

Magnesium Flashlight.

By Regierungsrath L. Schrank, Vienna.
Editor of the "Photographische Correspondenz."

READY FOR HER PORTRAIT

Block by TAILBY & PRICE. Photo by BYRNE & CO

WHETHER flashlight is to serve artistic purposes only, or whether it is to be looked at as a help to photographic scientific research, is a question which causes at the present moment a vast expenditure of German ink. The *Münchener Allgemeine Zeitung* sent a circular to over 100 professional photographers, requesting their opinion, and the majority has given a very unsatisfactory verdict.

Nevertheless, flashlight has numerous passionate admirers, and it is an established fact that we can obtain with it a breadth of treatment which reminds us more of painted portraits with strictly defined light and shade, than of the soft forms of the studio photograph. But this latter *genre* is also obtainable, and the public need not abstain from this popular method, up to now in general use, if taken by flashlight.

Of course flashlight rises in the estimation of the photographer as soon as the dark days of the winter season commence, and loses all interest with the coming spring, with its abundance of brilliant light. Although there is no studio in Vienna, which like those in Frankfort-on-Maine and other German towns, is situated on the ground floor, and exhibits its work directly to the passers-by, most excellent photographs have been taken by prominent artists in their own homes, with the help of magnesium flashlight, and some of them have been collected and will be published shortly in a very important *édition de luxe*. Besides the most tender modulation of the features, the draperies, the details of the living room, there is a total absence of the ugly shadows, and in many cases a street scene visible through the windows is most perfectly depicted in the photo.

The Paris *Figaro* published some time ago portraits of literary celebrities, but since then the technical part of flashlight photography has been greatly improved.

The artistic qualities and the most perfected scenes will mainly depend on the talent of the operator, but as soon as we get more acquainted with those masterpieces which were produced in this manner, and understand how pleasing the general character of the whole, there will be no lack of ambitious photographers, who will not rest until they have accomplished similar results.

It is not to be doubted that those "home portraits" will become fashionable, and will present a new and most beautiful and remunerative branch of professional photography.

MISS MARIE STUDHOLME

Design and Blocks by
FRED CATLING.

Photo by
ALFRED ELLIS & WALERY.

Collotype.

By W. T. Wilkinson.

GLAZED shadows are the cause of much trouble to the machine man, but it is a trouble that can easily be remedied · damp striking the plate in the interval between drying the film in the oven and washing out the bichromate after exposure in the printing frame. Another cause is the use of an oven not properly ventilated, in consequence the film is baked, not dried, and if the temperature is not kept low the glazed shadows are supplemented by a coarse grain. The use of an oven with a good flow of air through during the drying entails no trouble about the exact temperature; under such circumstances it can be anything from 110° to 140°, but in an oven not ventilated, if the temperature is over 125°, then we get glazed shadows. Collotype plates manipulated by the one plate one oven system, and the oven well ventilated and well guarded from damp, yield 99 per cent. of good ones, which is more than can be said of plates that are baked, either in the ordinary ovens, or dried in tiers, a system that yields the minimum of printable plates

Process Work at the Antipodes.

By Frank Middows.

PROCESS work in Australia and New Zealand still continues to make steady progress. During the last two years the illustrated papers have been exceptionally busy, owing to the many stirring events that have taken place during that period. Australian Federation, which was inaugurated in the early part of this year, gave process engravers a very busy time, and will, without doubt, in the future do much to improve business generally.

Labour-saving machinery has not yet come into general use amongst process workers in the Colonies; but a number of firms are waking up to the many advantages to be derived from the use of modern machinery in process work, and the demand is certain to increase as the volume of work continues to grow.

Three-colour work is moving ahead and the work that is now being turned out shows a marked improvement over that of last year. It is arousing a considerable amount of interest amongst illustrated newspaper proprietors in view of its suitability for coloured supplements.

The demand for labour in the process trade is well supplied at present, but as soon as fine etching comes into more general use there should be occasional opportunities for experts in this direction.

THE LATE PRESIDENT McKINLEY

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THE LATE PRESIDENT McKINLEY

The "Johnstonia" Mechanical Engraving Process.

By The Editor.

Low Tide

Block by Bersill & Ladyman. Photo by Ernest W. Philpott

SINCE the publication of our last volume, in which *the frontispiece* was the first example publicly shown of the above process, immense strides have been made towards the improvement and ultimate perfection of this wonderful method of mechanical engraving and printing, and the plate which we are enabled to present to our readers in this volume (the striking portrait of the late President McKinley, facing this article), is an evidence of this progress. As an individual example it cannot, however, convey any adequate idea of the marvellous extent and variety of the work which is being turned out every day by the Johnstonia process. One must go to the headquarters of the Johnston Die Press and see for oneself the thousands of specimens of every conceivable class of work which have been engraved by the Johnstonia process, and printed on the Johnston Die Press, to fully *realize the capabilities of the method.*

There is, we think, a pervading idea that the process and the press are only suitable for commercial engraving, such as letter headings, cheques, bank notes, etc., and that only a few examples of pictorial work have been produced with great effort, but such a supposition is quite ridiculous to anyone who is familiar with the organization and character of the business which is being carried on by the Company. The very fact that it is necessary to maintain an art department with a large staff, including a number of talented lady artists, and an art director of such eminence as Mr. E. M. Jessop, at once negatives such a wholly erroneous assumption. As a matter of fact, we are enabled to state that fully 95 per cent. of the work the Johnston Die Presses are doing, is art work of the highest character, which is intended to supersede the slow and expensive methods of hand-engraved steel and copper-plate work, photogravure, collotype and lithography.

It is in this direction of art work that the "Johnstonia" process appeals to us mostly, because of the immense possibilities it opens up, and we do not doubt that this is also the field for it to which our readers look with the greatest interest. We have therefore been at some pains to ascertain exactly the capabilities of the press and the process, and we must say that the results we have seen are most convincing. It is truly remarkable to see pulled off from the same press reproductions of well-known paintings of old and modern masters, with all the richness of the old steel-plate work, besides a fidelity which the latter never attained, side by side with the aggressively modern photograph, rendered with far more charming effect than the usual photographic methods of printing could ever impart to it. For instance, a photograph of the yacht Shamrock II. has been worked up in the mechanical process, and its graceful sails and rigging relieved by a background of sea and sky which is as bold and forceful as any of the old steel plate masters could ever have produced, and is such a picture as anyone would desire to possess and frame. This plate, which measures 13×9 inches is the largest that has so far been produced on the Johnston Die Press, but we understand there is practically no limit to the size which the presses can be built for, if demanded, and probably the near future may see some startling developments in this direction.

But the work that has struck us most of all is the multi-colour printing which is now being done on the press, and it is really surprising to see side by side a reproduction of a delicate water colour by Mr. Claude Hayes, and the bold masses of colour in one of Mr. Cecil Aldin's humorous conceptions. Here is the very antithesis of colour work, yet both rendered on the same press in a manner which has called forth from both artists the warmest praise. A very charming design of the Christmas Card order in colours, and with a gold bronzing, is an equally notable example of the "Johnstonia" process.

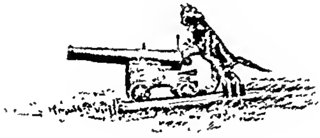
Pictorial post-cards, views on note paper, menus, invitations, book covers, are classes of work which have been done in immense quantities in the most pleasing manner. The lettering, line designs and ornamentation are all of the most tasteful character, in fact this is a strong feature of the "Johnstonia" productions, due no doubt to the large and skilful engraving staff which the company employs. What seems the most remarkable is the fact that the method of printing whilst being so rapid—about 1500 per hour—can discriminate between the heaviest lettering and the softest vignette on the same plate, which is a result unattainable by any other method of printing we are acquainted with.

We need say little about the specimens of bank-note printing, as our theme is rather the art side of the work, but these are remarkable in their way and have called forth a most flattering testimonial from the Russian Government, who are adopting the process for their bank-note printing. There can be no doubt that the unique character of the printing and the difficulty of imitating it, except with a costly installation of the Johnston Die Press, will be in itself a deterrent, if not an absolute preventative, of forgery.

If any of our readers are disposed to question whether the prominence we have given to the "Johnstonia" process is deserved, we would advise them to endeavour to see for themselves the unique character of the work which is being done, and we do not doubt that they will recognise the worthiness of the praise we have bestowed on the process, and will not begrudge to Mr. J. Yardley Johnston the success which has rewarded his long and patient efforts to bring to perfection his press and process, which are now so fully established that upwards of 400 machines are in use in various parts of the world.

The company have now established themselves in handsome premises in New Bridge Street, where the whole of the plate making staff are concentrated, and provided with the most up to date appliances it is possible to procure. The windows of the show-room on the ground floor are a never-failing source of interest

to the man in the street, who lingers with his fellows in crowds to watch the operator pulling off prints from this wonderful-looking press with a dexterity and precision which excites their wonder and admiration, especially after seeing in another window a pressman of the old school slowly and laboriously pulling off copies on one of the old-fashioned plate presses—a most convincing object lesson illustrating the march of mechanical progress in the twentieth century in a branch of the graphic arts in which it was for long thought that hand-work could never be superseded.



How's That?

Block by
Bursill & Ladyman Ltd.

Photo by
C. Hall

Lithographic Effects applied to Letterpress Printing

THERE is something about many lithographic jobs—even in one colour—which is more pleasing to many people than the best efforts of letterpress on similar work. This pleasingness is no doubt due to the fact that the lithographer draws his job, and is thus enabled to suit the arrangement of the design or the lettering exactly to the space at his disposal, the result being a freedom from stiltiness which the arranger of type is at a loss to compete against.

Many letterpress printers have long ago recognised this—and what is of more importance, have also recognised the obvious remedy in employing to the utmost the draughtsman in conjunction with the process engraver.

So much for simple work in pure line. Another lithographic effect, and one hitherto much more difficult to compete against, is the frequent use of tints (for my printer readers let me explain that by "tint" I refer to a tinted printing *surface*, not to a tint of ink), these tints being in line, grain or stipple, and used either as shading to lettering, as grounds or scrolls. The new shading films introduced by Messrs. Penrose & Co. are a means for obtaining these effects, and can be applied to letterpress methods equally as to lithographic. The shadings or tints can be added to the line drawing and engraved as a letterpress block by "line" process, or the drawing can be made in outline and the tints added on the zinc plate before etching. Here then is a means for appropriating another lithographic effect.

These shading films are also very largely used in lithographic colour work. There are many colour jobs, especially that kind of colour work which may be best described as "coloured line work," which can be done by letterpress as cheaply and in many respects better than by lithography.

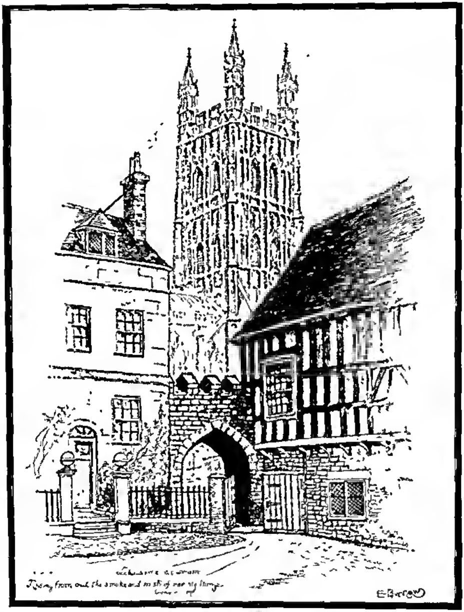
Forty or fifty years ago letterpress colour work seems to have been much more largely used, especially for small work, than it is to-day. Perhaps price is responsible for its disuse, but time ago letterpress illustrative methods had not the advantages they now possess. Letterpress has taken hold and made much of these advantages for black and white, but seems to have neglected colour work, or at any rate has not aimed any higher than three-colour process (one or two well-known Continental firms of course excepted).

Letterpress colour work should be much more largely used than it is at present.

E. H. Atkinson.

HIDE AND SEEK.

Design and Block by
BOURNE & Co



GLOUCESTER CATHEDRAL

Block and Corner Designs
from the Studio of
EDWARD J. BURROW, Cheltenham

CAPTIVE
By Herbert Horwitz.

Printed without overlays
from Blocks supplied by
The Patent Relief Printing Block Syndicate,
30, Worship Street, E.C.

From Copyright Engraving published by
Landeker & Brown, London, E.C.

AS GOOD AS A MOTHER

RESIGNATION

By B. Offor.

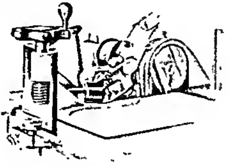
Printed without overlays
from Blocks supplied by
The Patent Relief Printing Block Syndicate,
30, Worship Street, E.C.

From Copyright Engravings published by
Landeker & Brown, London, E.C.

Relief-Block Dr. E. Albert, Munchen.
British Patent No. 5744.

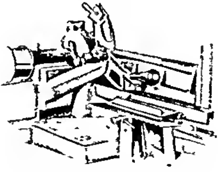
The Lining-Beveller.

THE Lining-Bevelling Machines made by John Royle & Sons, of Paterson, N.J., U.S.A., and sold by A. W. Penrose & Co., 109, Farringdon Road, London, have, within the past year or so, been greatly improved and are now placed on the market in a variety of forms. As the name implies, lining-bevelling machines unite two functions, namely, the bevelling of half-tone plates and the making around them of black and white lines. Originally, the lining was limited to a single black line, sometimes relieved



Raised-Line Beveller No 1

by a white line next the tint. In process of time, however, it became apparent that the machine could be used for more elaborate effects, composed of series of lines arranged somewhat like a frame around the picture. The demand for this class of work has been steadily increasing, and it is to meet it that the latest types of the lining beveller have been devised.



Graved Line Beveller No 1

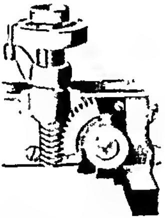
Lining-bevellers are divided into two general types—graved-line machines, which are made solely to cut lines in solid metal, used where plates are squared on the negative—and raised-line machines, which, in addition to making lines in solid metal, can be used for raising a black line from an etched surface. Both types are illustrated here, the machines shown being both single arm machines.

Raised-line work is limited to the formation of one or two narrow lines, but graved lines can be made in much greater variety—in fact, as many lines as the fancy of the artist may dictate can be made in a space about three quarters of an inch wide surrounding the picture. These lines can be variously spaced by using tools of different widths and by shifting the table and cutters.

Both graved and raised-line machines are made with one, two or three cutter arms. The object of multiplying the number of arms is to facilitate the work

Raised Line Beveller No. [illegible]

where the lines are made in series. The arms are adjustable, on parallel lines, and can be set to cut consecutively, thus making it practicable to cut lines in series, on all four sides of a plate, without readjustment. Spacing between the white lines can also be governed by shifting the table. This can be done by means of the ordinary table-shifting device, or an indexed attachment, showing movements in thousandths of an inch, can be supplied. This device is illustrated here, as also a three-arm, raised-line beveller, showing the plate set in the



Micrometer Attachment Applied to Table

machine, ready for lining. The illustration of scenery accompanying this article shows a plate with graved lines cut on a three arm machine. This cut, of course, does not by any means indicate the capacity of the machine, or the varieties of treatment, in the matter of lines, of which it is capable. Both black and white lines can be made of any width, and in any number, within the range of adjustment of the machine.

Skilfully handled, lines can be made expeditiously and with surprising accuracy. Of all the methods used for placing lines around half-tones none give such general satisfaction or produces such finished work as the lining-beveller.

The Lining-Beveller.

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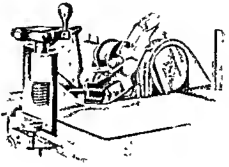

Raised Line Beveller No 1

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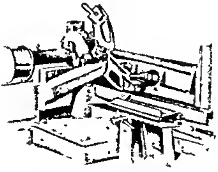

Graved Line Beveller No 1

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The bevelling of the plate is done in precisely the same manner as in the plain beveller, and follows immediately on the lining. Bevelling can also be done on unlined plates, if necessary, without any alteration or readjustment of the machine.

Since its introduction the lining-beveller has gained favour steadily, and is now used by leading American engravers, practically to the exclusion of the older forms of the bevelling machine. It is also used, to a more limited extent, in Europe, where it is not so generally understood as in the United States. It is advancing rapidly there, however, and will, beyond a doubt, soon be as indispensable an auxiliary of the European atelier as it now is in America.

Example of Graved Line work in Zinc, executed on the Lining Beveller

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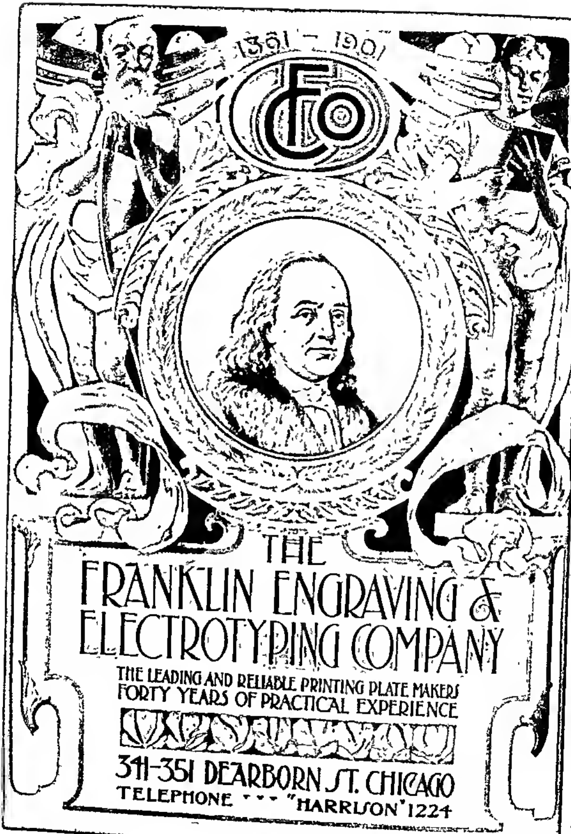
Example of Graved Line work in Zinc, executed on the Lining Beveller


WALLACE & GILBETT
COMMERCIAL & ARTISTIC
TELEGRAMS
ILLUSTRATE BIRMINGHAM
TELEPHONE 04970.
ILLUSTRATORS
IN HALF TONE LINE WOOD &c &c
CROWN BUILDINGS
& JAMES WATT ST
Birmingham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FORTY YEARS OF PRACTICAL EXPERIENCE
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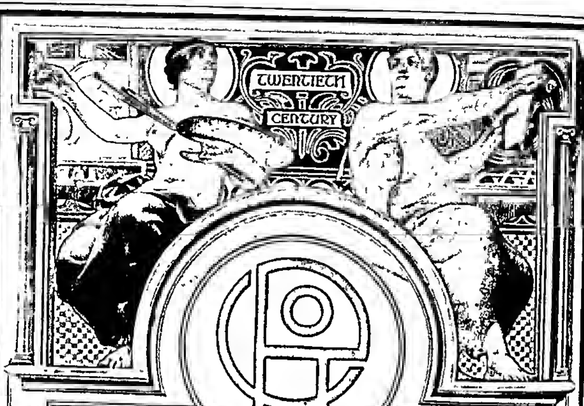

TWENTIETH
CENTURY

A FULL LINE

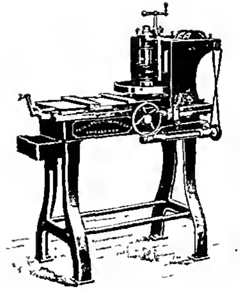
OF

Labour-Saving Machinery

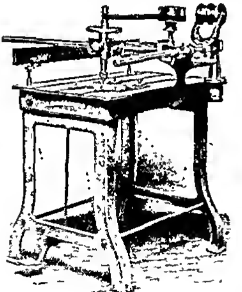
of a thoroughly practical nature is comprised in .

The "Reliance" Series

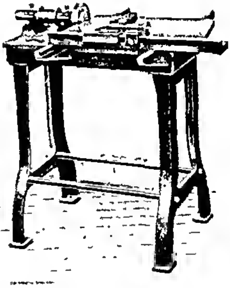
for Photo-Engravers and Electrotypers.



THE "RELIANCE" ROTARY PLANER ensures the block being planed perfectly flat and accurately type-high Thus the combination of these two machines makes what the printer must regard as an ideal mount—perfectly square at the sides, *level in surface*, and absolutely parallel between front and back



THE "RELIANCE" ROUTER is now well known as a thoroughly reliable tool, strong, steady and clean cutting. It is a cheap machine and easy to instal Besides ordinary routing it takes the place of a fret saw for cutting out line work.



THE "RELIANCE" FOUR-KNIFE TRIMMER, with Safety Head, as here illustrated You can see it's a simple machine It supersedes the slow old method of the shoot plane for trimming the edges of wood or metal mounts

The Four-knife feature gives a perfect cut, and the Safety Head saves the fingers

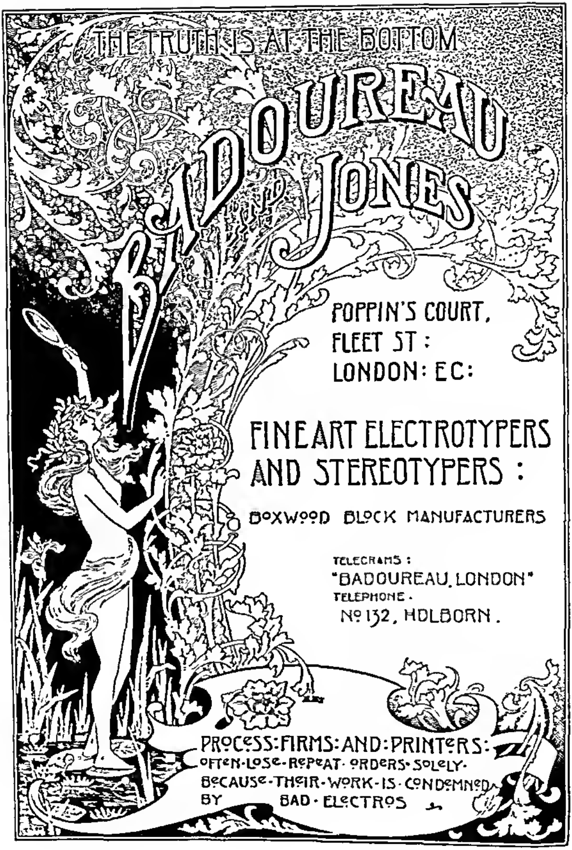
Sole Agents on this side for "RELIANCE" Machinery.

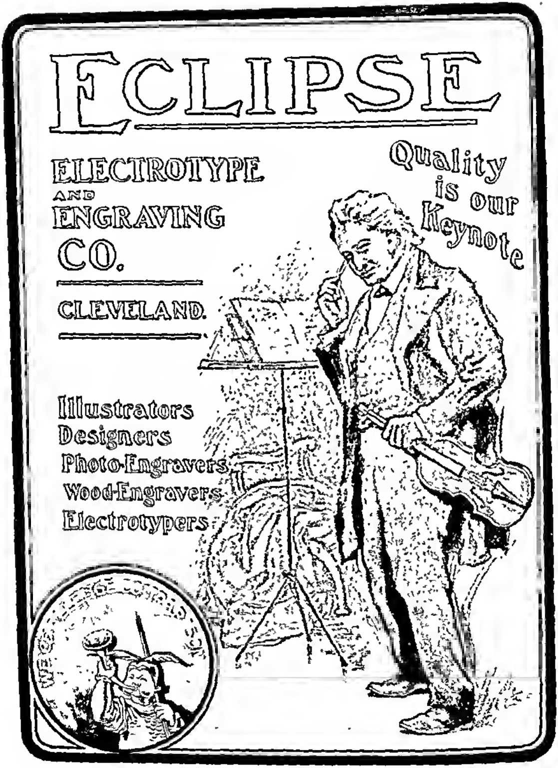
Penrose & Co., 109, Farringdon Road, E.C.
And at PARIS: 44, Rue Notre Dame des Champs.

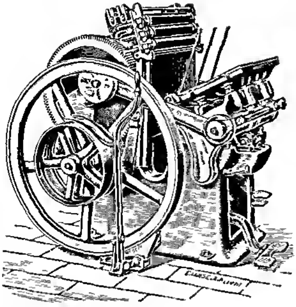
On Accidents and Business.

ANOTHER year passed! and here we Photo-Engravers are again assembled together displaying our abilities to each other, and to whosoever feels interested. One wonders, after perusing this work, where the very inferior half tone plates we occasionally see knocking around emanate from "Well, you see, it's like this," (this is strictly in confidence). All Photo Engravers have accidents occasionally, and produce by some means generally unknown to themselves, a really good block. When such a thing does happen, well er—its saved for Penrose's Annual, that's all; but there are a FEW firms, very few, who really do turn out good work regularly, and inferior work by accident When they do produce an inferior plate, it is relegated to the scrap-box if there is time to get another through; if not, and it has to go out, they are willing to replace it with a good one You can pick these few firms out easily, because they are growing businesses; a business to grow must be carried on on good business lines, supply a regular good quality of work, and give general satisfaction to their customers, consequently, when you find an engaving house which is really growing, "we mean of course, good honest growing," (not amalgamating two or three shakey ones together, and calling that growing), you can depend upon it, that is the firm for you to deal with and place your confidence in We have grown, and are still growing; our staff alone is now nearly **30 TIMES** larger than when we started in **1894.** We could show you by our books, that our increase in business one year over another for the last five years has been practically **50% per annum; the first six months of this year, 1901, show an increase in turnover, over the same six months of last year, of 50%. These are plain, straight forward, BLACK AND WHITE FIGURES AND FACTS,** and speak for themselves, do they not? Our success is accounted for by the fact that we are right in the front, we have a staff which we have trained ourselves, we are working improved methods of photo engraving which no other firm in the world possess, we give attention to our customers, and they can depend on the quality of our work being regular We have several new processes in hand which bid fair to revolutionise three colour and half tone work; we are never satisfied, we are always trying for something better.

P.T.O.


THE TRUTH IS AT THE BOTTOM
BADOUREAU
JONES
POPPIN'S COURT,
FLEET ST:
LONDON: EC:
FINE ART ELECTROTYPERS
AND STEREOTYPERS:
BOXWOOD BLOCK MANUFACTURERS
TELEGRAMS:
"BADOUREAU, LONDON"
TELEPHONE.
No 132, HOLBORN.
PROCESS: FIRMS: AND: PRINTERS:
OFTEN-LOSE-REPEAT-ORDERS-SOLELY-
BECAUSE-THEIR-WORK-IS-CONDEMNED
BY BAD-ELECTROS


ECLIPSE
ELECTROTYPE
AND
ENGRAVING
CO.
CLEVELAND.
Quality is our Keynote
Illustrators
Designers
Photo-Engravers
Wood-Engravers
Electrotypers

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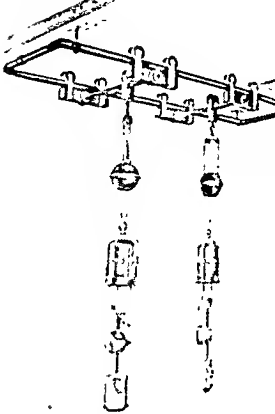
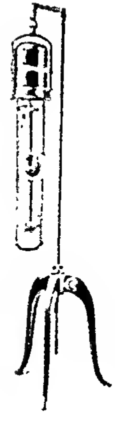
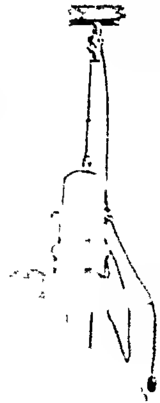


CONTINUOUS
OR
ALTERNATING
CURRENT.



CUSTOMERS should state the Voltage and nature of the current (whether continuous or alternating), and, if alternating, the Periodicity. Then we test the lamps before being sent out under exactly the same conditions. We also supply adjusted resistances or choking coils where desired.

ESTIMATES GIVEN FOR COMPLETE INSTALLATIONS



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